STACKS

POPULAR AVIATION

Combined With

Aeronautics

A magazine for every one interested in Gliders—Lightplanes—Models

Volume 7 SEPTEMBER, 1930 Number 2

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Illustrated by Herman R. Bollin

THE SPY *of*

A true episode of the War

By CAPTAIN JACK C. BURSEY, R. A. F., D. S. O.

NIGHT after night the German spy landed secretly. His safe landing place was a deserted and forgotten air field behind the British lines. For days he had been smuggling vital information back to Hun headquarters. But for a bum motor, his activities might never have been revealed.

Poperingh Aerodrome in Belgium, Headquarters of the famous 29 Squadron, Royal Flying Corps, during the World War was nearly always a scene of activity. If the boys weren't detailed for a patrol, they would generally arrange one of their own anyway! Possibly that was the reason that in August 1918 they destroyed 55 enemy planes and 17 enemy observation balloons in that one month without losing a pilot, killed or wounded! Incidentally, this was a record achievement during the World War.

"I shouted to him to stop, but he paid no heed! My finger ..gntened on the trigger, the gun barked, and a leaden bullet sped straight for the man."

Consequently it was nothing unusual when Lieut. Gates and I walked into the hangar and gave orders for our ships to be prepared for immediate flight. Quickly they were wheeled onto the line, the motors started and "revved" up, and then left idling to wait our pleasure.

Clambering into the cockpits, we turned into the wind and both opened our throttles at the same time, taking off wing tip to wing tip, and about six feet apart. Such was war flying—one knew just what the other fellow would do all of the time! Climbing rapidly we headed our planes in the direction of the front lines, and fifteen minutes found us at 11,000 feet over the once beautiful Houthoulst Forest—now just a mass of blackened, splintered tree stumps. It seemed to me then that it was a shame that such grandeur as had been there should have been wantonly destroyed by men fighting. But I quickly brought my mind back to flying—one dies quickly in the Air Service if his mind wanders too far away!

We had not been ordered on any particular job, but had come over solely to check up on anti-aircraft batteries, and cause the enemy as much trouble as possible. It was not long before the constant "woof" "woof" of bursting "Archie" shells sounded near us. Diving, side slipping, twisting and turning we had lots of fun, but all of the time we were carefully watching the ground and the location of the guns.

Ten minutes of this "Archie" baiting sufficed to show us that no new batteries had come into position, and soon I turned the nose of my plane in the direction of Zeebrugge, on the coast. Only a short time before the entrance to the famous Zeebrugge Harbor, with it's protecting Mole, or breakwater, had been effectively sealed when the British Navy sank the battleship "Vindictive" cross-wise in its waters. Far below us we could see the Mole, now a veritable fortress.

We were not allowed to fly unmolested for very long, for Fritz turned every gun that was possible on to us in a vain effort to bring us down. Those eighteen-pound shells burst under us and over us, but never right where we were! As soon as the gunners altered their elevation on the guns, we changed our altitude. Noting with somewhat of a smile that the enemy had locked the barn after the horse had been stolen by adding more guns to the harbor, we decided that we had had enough, and headed for home.

Just a nice pleasant little trip, with nothing much to report to the boys! But we weren't home yet!

WE COULD see in the distance the ruins of Ypres Cathedral and The Cloth Hall, and we kept our noses right onto those landmarks, flying throttled down. We were over a very quiet part of Belgium, and had both worked up a real he-man's appetite, and I know my thoughts were miles away when suddenly my attention was drawn to Gates's plane. He was flying almost underneath me, and was waggling his wings furiously—the signal of distress!

Cutting in front of him, I looked back and saw him point to the motor, and give that famous grin of his that saved my life once! Conked out! The reason why many a good pilot had never come back—shot down while gliding down with a bum motor. However, as we were a few miles away from the lines and over friendly country, I did not worry much. I knew that Gates was a good pilot, and one more forced landing added to his already long list didn't mean a thing. The ground was

MYSTERY FIELD

A forced landing brought Capt. Bursey to a deserted field in Belgium. The quick sequence of events furnished him with a thrilling surprise

a little uneven down below us, but a good pilot can set a Nieuport down onto almost any old potato patch.

I glided down alongside of him to watch him land, ready to land near him in case of a mishap, but intending to go on to the field for mechanics if he landed all right. I started to look the ground over, and was surprised to see almost directly below us what looked like a flying field with a "Bessoneau" hangar at one end. A "Bessoneau" hangar is nothing more than a few wood braces and supports covered with camouflaged canvas. Its doors are formed by curtains which pull across the front and lace up.

It seemed strange to me that I had never known of the field before, but I knew that Gates could land there easily, so I headed for my own field. On the way home I got out my map, and looked in vain for this particular field on it. I marked it in pencil, intending to ask a few questions about it later on. Soon I saw my field before me, and I landed and gave the necessary orders dispatching mechanics to Gates' aid, and as soon as they were on their way in a motor truck, I turned into the wind again to go back to him.

I SOON picked up the field with its lone hangar, and saw that Gates's plane was close to the hangar. He must have made a beautiful landing and rolled right up to the doors—a favorite trick of his. I couldn't see him about, though, and supposed that he was in the hangar looking for tools with which to work on his motor. I cut my motor, glided down and landed, then taxied my plane up close to his. Scrambling out of the cockpit, I was right up to the entrance when I noticed that the lacings on the curtains had not been unfastened. I knew he couldn't go in without unlacing them, so I shouted his name. I got no answer. Thinking that he might have gone over to a nearby farmhouse for coffee or food, I proceeded to go round the hangar to the small door that I knew was at the rear.

There it was—partly open! I walked up to it to push it further open so that I could enter, and just as I started to cross the threshold I got a grand surprise! Something heavy descended—obviously aimed for my head, but it missed by inches and landed on my left shoulder, and I shouted out with pain. As soon as I could recover I seized my .455 from its holster, and shouted to my mysterious assailant to come out, and when there was no response, I fired one round into the ground near the door.

I could just dimly see the mirky interior of the hangar, and then I noticed a ray of light coming from the front of it. Someone was opening up the front to escape that way! Running swiftly round the side of the hangar, I saw the thin form of a man wearing a British Army officer's topcoat running toward my plane, which was standing with the motor idling.

I shouted to him to stop, but he paid no heed! My finger tightened on the trigger, the gun barked and a leaden bullet nicked with a knife blade to make a severe wound sped straight for the man. It hit him in the thigh just as he was about to climb onto the wing of my ship, and he dropped to the ground and writhed in agony. Swiftly I tore the long scarf from around my neck, and rushed over and tied him up. Then

I got my second surprise! Under the British top coat was a German officer's uniform! A spy!

In spite of his suffering, I didn't feel sorry for him. I was worrying about what might have happened to Gates. Turning quickly, I ran into the hangar, where still another surprise was in store for me. There stood a sleek looking Aviatik two-seater, with British markings on the under side of the wings, and the well known black crosses of Germany on the upper surfaces!

And just beyond it I saw Gates lying —his head smashed from a blow apparently delivered with a heavy wrench that was near him on the ground! Sticky, oozy blood was trickling from the wound, and I retraced my steps and raced to my plane. Rummaging under the seat for a moment, I withdrew a small metal flask of brandy, which I always carried in case of an accident. Returning to my buddy, I forced some of the fiery liquid between his lips, and soon I saw a flicker of returning consciousness in his eyes. A sob of joy escaped my lips when I saw that — he looked at first as though he was beyond all human aid. Weakly he pointed to the wrench, and I motioned him not to move.

THE arrival of the motor truck from headquarters was the signal for a chorus of surprised remarks, and gently we put Gates into it, and then we returned to the spy. There was an appealing look in his eyes as he gazed weakly at me, as much as to say that he wanted me to raise my gun again and send a bullet crashing into his brain to end his agony. He knew that he would have to die, anyway. But I made no move, other than to order him placed alongside of Gates, and they both were carted off to the nearest hospital.

As they both started away, I wondered to myself as to what might have happened to Gates and me if that blow had landed on my head, as it was intended. Probably we should have both been on our way to Germany by then in the Aviatik—prisoners of war, captured on our own side of the lines. Next I turned my attention to the plane —in the cockpit was the finest instrument board that I ever saw on a war type ship. Everything for night flying, but what attracted my attention was a small metal container strapped just below the board. At first thought, I was going to grab it and pry it away from it's holdings, but I suddenly remembered a buddy of mine who had done a similar thing on an enemy plane forced to land on our side, and he had been killed in the resulting explosion. It had been wired to the gas tank, and simply moving it set the fuse off.

I examined the ship carefully, but could find no wires or cables connected to it, so I gingerly opened it. The lid, or cover, came off easily in my hands, and what I saw there made me start! It was packed with very small but complete maps showing the location of nearly every Allied regiment on the Front! And in the middle of the bundle were copies of orders from General Headquarters, detailing the attack that was to start three days hence! If that plane had ever got back to Germany, the War would not have dragged on until the winter of 1918.

Immediately I rushed to my plane and flew to Headquarters where I made my report, and a special detail of Military Intelligence men came to the field to make their observations. It was estimated, from measuring the tracks of wheels near the hangar and comparing them with the Aviatik, that the plane must have made at least five trips to enemy territory before it met its Waterloo.

Later investigation revealed the fact that a Belgian squadron had occupied the field some time previously, but had been driven off and had not had time to remove the hangar when they left. Apparently they were too busy to come and take it later, and this little slip probably cost the Allied armies a lot of lives.

Gates is still hanging around flying fields "somewhere in England," and his wife is often accused of causing the nasty gash on his skull! But he and I know that she didn't!

The spy was tried and found guilty later on, and was put to death "somewhere in France" by a firing squad.

Both Gates and I attended the affair, and we likewise went to his funeral the same day. You've simply got to respect a man who will deliberately face death for his country—no matter what that country is. And when he "goes out" like a man, as this one did, well—

C'est la guerre!

The Fastest Fighting Plane in the World

OUR old controversy, the monoplane versus the biplane, has recently received another contribution that for the time being scores another point for the biplane faction. This is the new Boeing "100," a biplane fighter that has attained a speed of 196 miles per hour at an altitude of 8,000 feet in the hands of army and navy pilots at San Diego. It is considered the fastest fighting plane in the world at the present time.

Installing a 425 horsepower Pratt & Whitney "Wasp" engine into a small single seater would naturally result in a tremendous speed and maneuverability, but to our minds the most interesting feature is the adoption of the biplane construction for this purpose at a time when the aeronautical world can be said to be "monoplane mad," and further, there has been no attempt toward the removal of the exposed interplane bracing that has been the basic stock argument against the biplane.

A view of an Army pilot stepping into his Boeing Fighter. In a few minutes he will be flying in formation at 196 m. p. h.

As might be expected, the proportionately large engine for this small craft introduces interesting construction. First, the great diameter of the radial engine results in the cylinders projecting far outside of the fuselage section, and to overcome the engine resistance a ring shaped cowl is run around over the cylinder heads, effectively streamlining them and adding thereby approximately ten miles per hour. Second, the large diameter propeller necessary for transmitting the 425 rated horsepower makes it necessary to boost the ship up on a very high chassis, proportionately much higher than with the ordinary run of ships, and remarkable to say, no attempt has been made toward adding streamline fairings to this sizable undergear.

Because of the wing arrangement and the location of the cockpit, the pilot's visual range is unusually good. He can see his chassis wheels over the lower plane or straight down past the lower edge. He is unobstructed forward as there is a good gap between the fuselage and the top wing, and being well to the rear of the wing assembly has a good visual angle to either side or to the rear, all of which are important assets in a fighter type.

Speed, climb, maneuverability and firing radius are essentials of the fighter type and are prominent to a high degree in the Boeing "100," although the performance is not quite up to the mark set for fighters by F. Trubee Davidson, Assistant Secretary of War for Aeronautics, who says; "The speed of pursuit planes has been increased only from 140 miles an hour to 170 since the war, and that of observation planes only from 139 to 159. Our pursuit planes should have a speed of well over 200 miles per hour and our observation planes of over 180 miles per hour."

Passenger Stuck

A 500-pound passenger was recently unable to make a flight at Lambert, St. Louis Field, when, after climbing onto the plane, he could not get through the door.

Plane Takes Off By Itself

ED STANDRING, an Aeronca demonstration pilot, has a rather unique way of demonstrating the AERONCA'S uncanny stability. After warming up his motor a bit he taxies into his take-off position. When he's all set, with the wind directly ahead and the runway clear, he takes his foot off the rudder, pushes the throttle all the way forward and then holds both hands over the side. The ship gains speed, the tail raises off the ground and soon takes-off *by itself*. The angle of climb with a full throttle is normal and it continues to climb until the throttle is retarded to cruising speed. Between 1800 and 2000 R. P. M. the nose is smack on the horizon and when the throttle is pulled back to idling speed the nose drops to the proper gliding angle of its own accord.

If you have a landing field ahead, it's even possible to land without human control. You might bounce two or three times, but it can be done.

Lindbergh Drives Automobile

IT may be a shock to our readers, but Colonel Lindbergh uses an automobile once in a while. Here he is sitting at the wheel of his new car.

If you wish to know what kind of car this famous hero drives, it is a Franklin Convertible Speedster. It is a standard model of light grey with green wire wheels.

Neat Racing Ship

ISN'T this a spiffy looking racing plane? It is a Travel-Air Mystery Ship. Jimmy Haizlip, assistant to the well-known former Army flier, James H. Doolittle, is standing beside the ship holding the trophy which he won in the Free-for-All race at Springfield, Mass. recently.

The Curtiss-Bleecker Helicopter

The machine which is expected to rise vertically is shown above. At the right is its designer, Maitland B. Bleecker, seated at the controls.

CAN a heavier than air machine rise two feet off the ground, hover, and stand still in mid-air? Helicopters are supposed to be able to do this. A successful helicopter can rise off the ground in the rear of its hangar, float gracefully out of the building and then climb vertically into the skies.

The Curtiss Aeroplane and Motor Company have been working on the Curtiss-Bleecker Helicopter which, it is hoped, will be able to accomplish these startling feats. First tests have been successfully completed but final results are yet to be proven.

Many helicopter designs have successfully lifted themselves off the ground vertically. Some have even attained considerable altitude. But none have satisfactorily been able to rise and descend vertically, hover, and move horizontally with sufficient speed.

The Curtiss-Bleecker machine consists essentially of four large wings or blades, mounted at right angles to one another and revolving in a horizontal plane. The wings are caused to revolve by propellers, one to each wing, mounted forward of the leading edge, about two-thirds of the way out. The propellers are driven through a gear and shaft arrangement from one central "Wasp" air-cooled engine, mounted horizontally. To each of the wings are attached outrigger booms mounting small elevators or tail surfaces. Thus, each unit is, in reality, a small airplane, consisting of a power driven wing with a tail which can control the angle of incidence of the wing at any point.

Beneath the four wings is suspended a small fuselage in which are located the crew and which is equipped with a fairly conventional type of landing gear.

The Curtiss-Bleecker wings are made to revolve by the pull of their propellers. This design means that the Curtiss-Bleecker machine can rise vertically off the ground without any run and can hover indefinitely over any spot, performances which cannot be accomplished by the autogyro type of machine.

Start a Flying Club

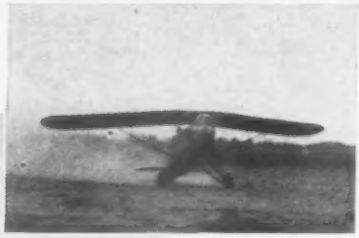
WOULD you like to start a flying club? Many aircraft manufacturers have organized club plans whereby a group of young men and women can combine efforts, purchase a plane, and secure a complete flying course.

The Curtiss-Wright plan calls for 25 members. The initiation fee is $130 and includes part ownership of an OX-5 Robin. It is estimated that the cost to each member for the first year will be $387 to include dues, 10 hours dual, and 10 hours solo.

Graf Relics Now Valuable

THE airmail which the Graf Zeppelin carried around the world has increased greatly in value with the passing of time, but it does not have a "corner" on desirability by collectors. This honor is shared with the little pieces of cardboard on which the airship's cuisine was printed. At a recent sale the menu cards which the Graf flew on the long trip brought $8.85 each. The Tokio-to Los Angeles airmail covers, listed at $5.00, brought $9.70 each, nearly 100% increase.

Sport Plane Designed with Folding Wings



The EAC 1 Parasol can be stored in a garage 20x11 ft. It will cruise at 100 m. p. h., has a top speed of 120 m. p. h., and lands at 45 (see above photo).

DESIGNED for the sportsman who will use it for informal hops on week-ends, the EAC 1 has folding wings which allow for storage in a space 20x11 feet. Dropping in on friends for the week-end the pilot-owner can place his plane in an empty garage, stall or barn and proceed to enjoy himself.

This parasol wing monoplane has a cruising speed of 100 miles per hour, lands at 45, uses about five gallons of gas per hour, and has a top speed of 120 miles. It is powered by a Wright-Gipsy engine developing 90 to 100 horse power.

So far, the plane has been in the experimental stage, but the Engineers Aircraft Corp., of Stamford, Conn., led by Major Thomas G. Lanphier, aide to Col. Chas. A. Lindbergh, are preparing to go into production on an initial output of one plane a week beginning about July first.

The Largest Flying Boat in America

THE Miami—new 33-passenger Consolidated Commodore—largest flying boat thus far built in the United States, which was recently launched last week at Buffalo. The plane carried 30 paid passengers with a crew of three and will be put in service immediately by the NYRBA Line on its South American runs. It is a development of the 24-passenger Commodores which are now in use by this line.

Boy Aged 17 Owns Airplane

JOHN WILLIAMSON, a Worcester, Mass., lad, is an airplane owner at the age of seventeen, and the youngest airplane owner in New England, as well as one of the youngest in the country. His plane is a Command-aire three-place biplane, bought for him by his father. He is now taking instruction for a transport pilot's license, and is also taking instruction in airplane and airplane engine mechanics from a boy a year younger than himself, Freddy Desjardins, also of Worcester, who holds a government license as an expert airplane mechanic and is the youngest airplane licensed mechanic in the United States. As soon as John Williamson gets his transport license he is going to use his plane in commercial aviation and earn enough at the start to repay his father the amount paid for the plane.

TALES OF THE CATERPILLAR CLUB

Two flying cadets collide in mid-air

THE Caterpillar Club has two more members. And they are both Flying Cadets of the Air Corps. Cadets Kreyssler and Merrifield were racing *head-on* at 125 m.p.h. A nose to nose collision was averted when one flyer banked to the left and the other dove. The right wings of the planes became entangled and both pilots were forced to "bail out."

The two cadets were practicing aerial acrobatics at an altitude of 4500 feet about 16 miles from Kelly Field.

"I was approaching the other plane in a head-on manner at a little below its level, the engine turning about 2,000 r. p. m., and an air speed of about 125 m. p. h.," Cadet Merrifield stated. "To avoid collision I banked left. The other pilot subsequently stated that I was in his 'blind spot' and that he thought it best to dive away. A collision of the right wings of the planes ensued, throwing my plane into a power spin instantly. Finding that thrusting stick all the way forward had no effect on the spin, I leaped from the plane from a standing position. When quite clear of the plane I pulled the rip cord. The Irving seat type parachute opened immediately and I watched my plane spin to the ground and crash in the mesquite. I landed about 600 yards from the plane in a mesquite tree."

Cadet Kreyssler's escape was the more thrilling. "We each turned toward the other," Cadet Kreyssler stated, "and struck nearly head-on, not having room to again turn away. The ship was not under control but was spinning down when I jumped, using an Irvin service seat type parachute. Upon the impact of the two ships, I was stunned so badly that I have no remembrance of the speed of the ship, how I left or how I pulled the rip cord or how far I fell before the parachute opened. All my actions were due to my subconscious mind. I have a vague remembrance of realizing I had been hit and a whipping motion of my ship. I believe I felt it four times, and I have a faint remembrance of releasing the safety belt on the first attempt and trying to stand up in the cockpit. After a couple of attempts, I managed to stand part way up. Everything seemed still with no pitching motion and next I was conscious of was that I was reaching with my left hand for the rip cord.

"It was some time before I felt the parachute open and I have no remembrance of changing hands or pulling the cord, and as I felt the parachute open I glanced slightly over my left shoulder and was impressed with the fact that Cadet A. S. Merrifield's parachute was open some distance above me. I relaxed and became completely unconscious and have no remembrance whatsoever of gliding to earth. I have only a very faint remembrance of landing and falling to the ground, face down, in the direction the parachute dropped. There was a four-mile surface wind, so I was not dragged. The weather was excellent.

"My ankles pained me terribly, and when I first attempted to stand up I fell over again. After lying there some time, I again arose and started walking around the parachute, still stunned but regaining consciousness. I have no knowledge of when I freed myself from the harness and I was still pacing around the parachute when Mr. Hoffman found me. He took me to his wagon and went to find Cadet Merrifield, and upon returning with him we went to his home where we reported ourselves to the Operations Officer at Kelly Field. I received a slightly sprained ankle from the landing."

The author is shown with the skeleton of the home-made glider.

Sling-Shotting Our Home-Made Glider

The personal account of a farm youth who built a glider in 21 days and devised a unique way of getting it into the air.

By
August J. Valentine

I WAS very much interested in gliders. I did not have the necessary money to buy one, or buy parts to make a glider. But where there is a will there is a way.

Obtaining supplies was a big problem, but the farm had trees—basswood trees. It also had an abandoned old saw mill.

On a Sunday two trees were felled by a co-worker and myself. Neither of us had had any experience in handling a saw mill, but two days later we surveyed with considerable satisfaction enough wood cut for the glider.

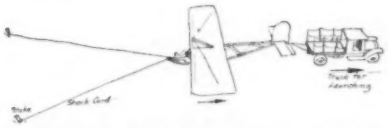
Once we were supplied with the necessary wood, work began on what was to be the first glider in this vicinity.

We had several plans on hand and several booklets on the subject, but the plans in a current popular magazine appealed to us most.

We used every spare moment in the construction of the glider. When the sun passed down behind the hills and it became dark we carried the pieces of the frame work (ribs, etc.) into the house and worked by artificial light, supplied by the dear old Delco—the old standby.

When the glider had taken on such proportions that it could not be carried to the house after dark we trained the Chevrolet truck lights on the growing form of the aircraft for illumination.

The glider was completed in 21 days but the launching of it by ourselves became a real "propolition," as Amos and Andy would say.



A diagram of the unique manner in which the author launched his glider. Note that the action is similar to that of a pebble being shot from a sling.

After we had overcome so many difficulties in construction we were determined not to be balked.

And this is the real purpose of this article, to tell how we launched the bird.

We started out by doing exactly what we were told not to do. We used the same truck that gave us illumination in our night work and a hundred feet of ½ inch tow line to launch us. What's a couple of broken ribs, especially when the broken ribs are on the glider and not on us? The towing was not very satisfactory and after this minor "crash" we substituted the rope with a shock absorber cord.

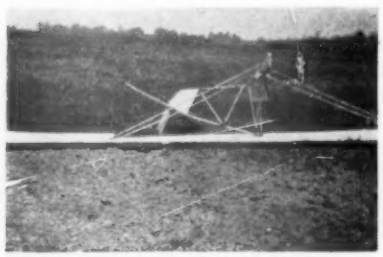
Ordinarily it takes a crew of 6 or 8 to launch the glider successfully, but we didn't want an audience. We wanted the skeptics and the cynics as far away as possible at least until we had tried out the ship.

We had a half a dozen ideas of catapulting the glider into the air before we hit upon the idea of this unique contrivance that we are about to describe.

First we procured a wagon axle and cut it in half for stakes. Then we attached two rings at the ends of cord and one in the middle. The stakes were driven in so that when the glider was attached to the cord it is shaped in the form of a "V" with the point of the angle at the ship's nose. After the glider was attached to the rope one of us would get into the glider and the other would pull it backwards with the truck until the rope was taut. At this point the driver of the car would get out and turn the glider loose by a special lever made for that purpose.

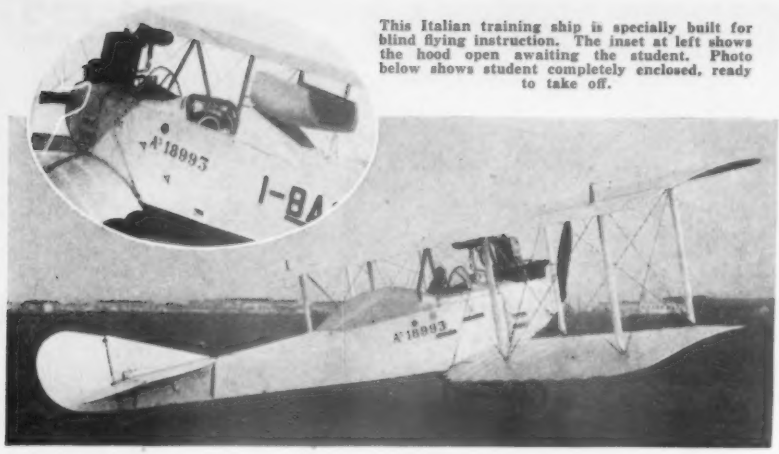
The taut shock absorber cord pulled the glider forward and in this way glider and its occupant were catapulted into the air. And boy we went. It seemed as all Hell turned loose!

In time other devices will be invented whereby one will be able to launch himself into the air, but we will never forget our attempts to launch our first home-built glider.



Left, The author ignored one of the "don'ts" and stretched the rope without any one at the controls. Result:—the glider took off by itself and landed with considerable damages as shown in the picture.

Right, The Valentine glider assembled and ready to launch.



This Italian training ship is specially built for blind flying instruction. The inset at left shows the hood open awaiting the student. Photo below shows student completely enclosed, ready to take off.

Glider Students Can Secure Government Permit

GLIDER student permits, authorizing the holder to receive instruction and to solo licensed gliders while under the jurisdiction of a licensed glider pilot, will be issued by Department of Commerce inspectors and Department divisional offices upon application. No physical or written examination will be required. A form has been drafted which is both an application and student permit, a perforation permitting their perforation. These forms may be obtained from any Department of Commerce inspector or divisional office.

The non-commercial glider license will serve the group that is desirous of operating gliders only for sport and pleasure. This license parallels, to a degree, the private airplane pilot license. The only examination required for this license will be a flight test which will consist of a minimum of three flights including moderate banks in either direction. Applications for non-commercial glider licenses may be made on regular pilot application forms obtainable from Department inspectors or divisional offices.

The commercial glider pilot license will be issued to all applicants physically qualified who successfully accomplish the flight test involved. Applicants for the commerical license are required to pass a physical examination the same as is now required for the private airplane pilots license. There is no written examination.

The flight test for the commercial glider pilot license, in addition to normal take-offs and landings, includes a series of general and moderate banks, 360-degree turns and precision landings.

The glider pilot licenses will be issued to all grades of airplane pilots upon a satisfactory completion of the tests involved.

Applications for the commercial glider pilot license also may be obtained from Department inspectors or divisional offices.

Italian School Teaches Blind Flying

CONSIDERABLE interest has been aroused in the United States in the matter of blind flying. Several prominent flying schools now require their advanced students to take some training in flying solely by their instruments.

In Italy also this exact type of flying is being encouraged. The first school offering this type of training is the Breda School of Pilotage, near Milan. They are using specially constructed two-place dual control training ships.

Special Parachute Produced for Air Passengers

TEN seconds after passengers on air transports are warned to leave the ship in case of midair emergency they will be able to float safely earthward by means of a new attachable parachute.

Instead of the cumbersome harness of parachutes now in vogue the bulky part of the new air life saver is carried as part of the equipment of the plane's cabin. All the passenger is required to wear before going aloft is a light fabric vest.

Besides the vest worn by the passenger, a snug-fitting jacket that contains a metal ring at the center—the only other part of the equipment is the packed 'chute—is folded into a light small package that can be inserted into the side of a plane's cabin. One pack will be carried above each passenger's chair, the outer facing of the pack to be covered to match the transport's upholstering.

All the passenger will have to do is pull the pack from the side of the plane, snap the hook of the pack into the vest ring and leap from the cabin door.

The release ring that opens the 'chute is attached to the 'chute pack. A slight jerk, after the jumper is clear of the ship and the twenty-four-foot silken lobe blossoms out to deposit its wearer gently on the ground. This new type "'chute" is being produced in San Diego by the Russell Parachute Company.

An Interesting Letter from Australia

PERCY PRIOR of Sydney, Australia, writes us of an absorbing hour he recently spent at the New South Wales Aero Club's control room, where the newly-established radio school is successfully experimenting with aerial conversation between pilot and ground crew.

"High in the heavens, a little black dot, hardly visible in the clouds, was a 'Gypsy Moth' maneuvering in spirals. At my shoulder before a complicated switchboard of instruments sat the operator in charge of the wireless control station.

"Suddenly he adjusted his earphones, and began speaking into space, or rather into a transmitter hanging in front of the switchboard. He was talking to the pilot of the airplane which we now could not even see as we peered through the window.

"The few moments' 'conversation' took place between the man on the earth and the man in the sky as naturally as if they had been in the same room. Then our ground operator signed to us to watch closely through the outlook.

"From over a low-lying cloudbank miles away the 'Moth' presently reappeared, and, speaking in the steady voice of a broadcast announcer, the ground operator ordered the machine to ascend five hundred feet and then, after two seconds, to 'find cover.'

"The command had hardly been uttered when as we gazed eastward we saw the 'plane shoot rapidly up until it reached the prescribed height. Keeping a horizontal course for a quarter of a mile or so, it then made for some cirrus clouds.

"The wizard beside us forthwith proceeded to demonstrate other feats of his art. Sitting there at his wireless telephone he was almost as much in control of that airplane, maneuvering thousands of feet aloft, as if he had been sitting in the machine.

"The pilot responding instantly to his word of command, did exactly what he was told to do. There was no delay and no confusion.

"The conducting officer placed earphones over my ears and moved a lever. Came the voice of the flyer distinct and clear through a curious throbbing background of muffled sound."

JOHN B. RATHBUN*
Says—

500 m. p. h. Can't Be Done!

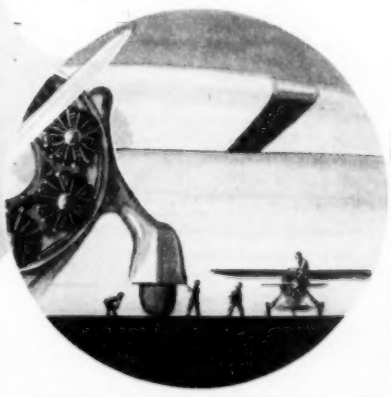
Present type planes would burn up at 500 m. p. h. The terrific heat caused by the air resistance would melt steel, claims prominent engineer and author

A SPEED of 500 to 1,000 miles per hour has long been the theme of the air-dreamer. To this end, many weird inventions have been proposed from time to time for attaining such speeds. All of these trick inventions, however, show that the actual facts in the matter have received but little attention at the hands of the romancers.

Even the most amateurish of the speed fans has recognized the necessity for tremendous power plants, but even with the wildest of imaginations he has not come anywhere within shooting distance of the truth. Above 500 miles per hour, the laws of air flow and resistance change radically, and it is this new resistance that we must overcome it we are to rise much above the present maximum of slightly over 300 miles per hour.

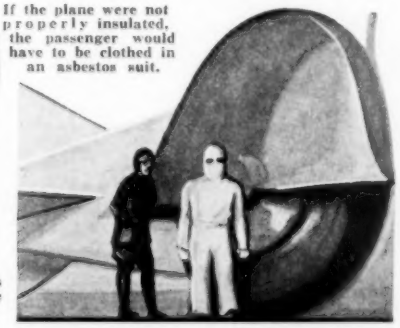
What air travel will be at 500 m. p. h., according to Mr. Rathbun. The passengers at left are comfortably seated in a windowless fuselage made of specially treated steel. The cabin is protected against the heat by means of insulation and refrigeration.

Just as a comparison, the speed of sound through the air is approximately 1,080 feet per second, or very nearly 750 miles per hour. At flying altitudes, due to lowered air density and lower temperatures the speed of sound is reduced to 500 m. p. h. approximately (See calculations on next page). A modern high power service bullet travels more than twice as fast as the sound wave, approximately 2,250 feet per second or 1,500 miles per hour. These two existing examples will give us an idea as to what will be required of this super-speed airplane in the way of power and performance. Very fortunately a great deal of data has been gathered by scientists on the transmission of sound and upon "exterior ballistics" or the study of bullet flight, so that we will have some actual figures to work with in estimating our high speed futuristic airplane.



A tremendous engine or combination of engines would be required to propel a plane through the air at 500 m. p. h.

It has been repeatedly demonstrated by bullet flight measurements that there is a tremendous increase in the air resistance when we reach the velocity of sound, or 500 miles per hour. The slow motion pictures taken of bullets in flight confirm these measurements and indicate a new arrangement of the air about the bullet. Instead of flowing more or less smoothly over the surfaces, as with the present airplane speeds, the air is torn violently wide open by the bullet and so highly compressed that the air shows as a dark liquid streak in the photographs. It is believed in some quarters that the air is compressed to liquification at the nose of a bullet having a speed of 3,000 feet per second. Now this upsets all of our nice plans that we were making for our around-the-equator tour, and makes it necessary to revise all of our equipment. If the pressure at the nose of our ship will be sufficiently high to liquify



If the plane were not properly insulated, the passenger would have to be clothed in an asbestos suit.

*Pioneer aircraft and engine designer, founder of Chicago Aero Works (1909) and author of several well-known technical books on aviation.

air, then we must give up all thought of windows or any thought of viewing the scenery.

AND then there is another sad fact that arises to spoil our dream. This is the knowledge that the friction of the air on the sides of our super-soarer will quickly raise the temperature to dull red heat, making it necessary for us to don our asbestos pajamas and carry a refrigerating plant along so that we won't burn up. At ordinary flying speeds of 100 miles per hour, the heat due to air friction is hardly noticeable, but at 500 miles per hour where the resistance is increased about 900 times, we can reasonably expect to become uncomfortably warm at the end of the first hour, and still warmer at the end of the trip if we succeed in lasting that long.

A meteor from the outer spaces enters the earth's atmosphere at a speed of about 1,600 miles per hour, or about three times our estimated speed. If any of our readers still remain uninformed as to what happens to this meteor after a brief visit of a few seconds, we can tell them positively that it is heated white hot and converted into vapor by the air friction, not withstanding the fact that its temperature was about 460 degrees below zero a few moments before. And still they talk of 2,000 miles an hour in the Sunday supplements as though it were merely a matter of adding more engines and putting on more propellers!

A projectile flying at the rate of 2,250 feet per second lands at its destination in a very heated condition, sometimes in a semi-plastic state, and it was not the heat of the powder that did all this. To conceive of flying at this speed for more than a few seconds at a time is inconceivable for the reason that the shell of the ship would soon be white hot—always providing that we could assemble enough power to accomplish this feat. An air duct becomes very warm when the velocity of the air passing through it is only 100 feet per second, and yet we are considering the advisability of sliding through the air twenty times as fast!

And now to the matter of power, which as the poet says, is something else again. To travel through the air at 500 miles per hour requires a power increase of approximately 960 times the power at 100 miles per hour. If we are using 100 horsepower in our present plane at this speed, then we would be compelled to install 960,000 horsepower, and I hardly think that we would have room for this engine, let alone space for the storage of the gasoline and oil. To attain such a speed means a radical change in the motive power department, and it is likely that such attempts can never attain their objective until we have learned how to avail ourselves of the tremendous energy that now lies latent in the atom. By breaking up the atom into its electrons we may be able to obtain sufficient power but in no other way.

Mathematical Proof That an Airplane Will Melt at 500 M.P.H.

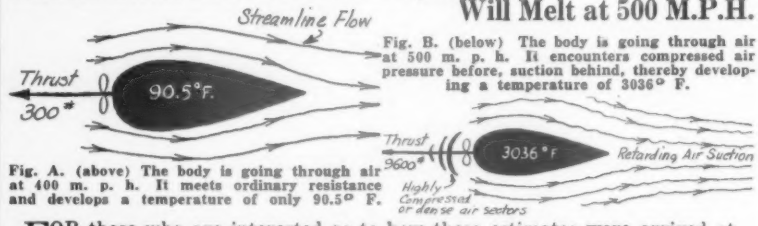


Fig. A. (above) The body is going through air at 400 m. p. h. It meets ordinary resistance and develops a temperature of only 90.5° F.

Fig. B. (below) The body is going through air at 500 m. p. h. It encounters compressed air pressure before, suction behind, thereby developing a temperature of 3036° F.

FOR those who are interested as to how these estimates were arrived at, we will give comparative figures for a body travelling at 400 M. P. H., below the speed of sound, and another body travelling 500 M. P. H. at the speed of sound, as shown by Figs. A and B, respectively. We will assume the following fixed dimensions for both conditions:

K=0.0002=Coefficient of form for body of given type.
A=10 SQ. FT.=Area of body cross section.
4,200=Constant for converting work units into heat units obtained from the standard figures, 5,280 feet per mile, 778 foot-pounds per B. T. U., Specific heat= 0.6, 375 FT. Min. to M. P. H.

Now let us compute the temperature (T′) of the machine at a speed of 400 M. P. H. where the law of air flow is still according to "velocity cubed," or at speeds now common.

$$T' = \frac{K \times A \times V^3}{4200} = \frac{0.0002 \times 10 \times 400^3}{4200} = 30.5^\circ F.$$

This is the rise above the temperature of the surrounding air, hence if the temperature of the air is 60°F., then the total temperature of the machine will be 90.5°F.

At a speed of 500 M. P. H. the law of air flow changes with the result that there is a tremendous jump in the temperature. The speed only increases 25 per cent, but the temperature is increased ten times.

$$T'' = \frac{K \times A \times V^4}{4200} = \frac{0.0002 \times 10 \times 500^4}{4200} = 2{,}976^\circ F. \text{ Rise.}$$

Or the total temperature with an air temperature of 60°F., is 3,036°F. This is plenty hot enough for steel melts at about 3,000°F.

This problem is based on an altitude of 5,000 feet where the velocity of sound is close to 500 M. P. H. At lower altitudes, the air density is greater and the speed of the sound waves is correspondingly higher, about 747 M. P. H. with an air temperature 60°F.

This indicates very clearly what will happen when we pass the critical speed of sound and is checked up by the high temperature of bullets and shells after a few seconds flight. This heat cannot come from the powder because its contact with the powder flame is only a small fraction of a second, and further, because the longer the bullet flight the hotter it becomes. A meteor or "falling star" is rendered incandescent and is finally burned up by air friction when entering the air at about 1,600 M. P. H.

Airplane Prop Slaughters Mosquitoes

THE night airmail is doing something about the mosquito problem, although it is entirely unintentional, according to Eastern Air Transport, Inc. Countless insects, many of them the biters, nestle down in the velvety grass of airports. The mail planes drop in to take on and discharge cargoes, then roar across the fields and into the air again. While the craft is thundering along the ground dozens of the insects "take off" too in an effort to escape the mysterious thunder that is bearing upon them. The airplane's propeller and wings become discolored with their blood.

Sikorsky Celebrates

Mr. Sikorsky flying his S-2 twenty years ago.

ON June 16, 1930, Igor I. Sikorsky, Vice-President in charge of all Engineering of the Sikorsky Aviation Corporation, celebrated the 20th anniversary of the first successful flight of an airplane of his design. The model was called the Sikorsky S-2 and was powered with a 25 h. p. Anzani engine. The top speed was 50 miles an hour.

At this time Mr. Sikorsky was just 21 years of age, and had already been working two years in aviation. His model, the S-1, was powered with a 15 h. p. Anzani engine, and was only capable of taxiing around on the field. It was too underpowered to leave the ground. This model was tested in May. The ship was entirely redesigned and a more powerful engine installed. So on June 16th, 1910, the S-2 actually left the ground, with the designer at the controls, and flew about 800 feet at 2 to 3 feet altitude.

The parachute pulled us through the water, tail first, at a fairly good speed. It was the improvised sail that saved the plane and its crew that night.

Forced Down on the Open Sea

By ENSIGN CHESTER C. WARD, U. S. N.

Half the Fleet were searching for the two lost pilots. Out of gas, the disabled plane was drifting helplessly towards the high seas

THE observer I took with me on that eventful morning in March was a young ensign who had never been up before. Incidentally, he is going to Pensacola, Florida, for aviation training and I suppose he will have thousands of hours in the air before he retires, but I am perfectly sure he will never forget his first flight. It came so close to being his last.

I was Junior Aviator on the U. S. S. Detroit, when the Light Cruiser Divisions left Guantanamo Bay to fire torpedo practices on the way to Gonaives, Haiti. All the scouting planes were slated to take the air and "chase" the torpedoes, which means we were to observe the practice, and lead the ships to the torpedoes when the runs were over. Torpedoes cost around ten thousand dollars, so it's easily seen why every precaution is taken to prevent their loss.

Mine was the first plane to be catapulted, so I was in the air half an hour before any of the others—a fact which was to cause me considerable regret before many hours had passed.

We were using the maximum pressure in the catapult, and when my plane started forward, and my head snapped back, I philosophized, "Well, you darn fool, at last you've broken your neck!" The impression lasted only a minute, and soon I was looking down on a sea of deep blue-green water. The trim cruisers looked unreal, and I recalled the Ancient Mariner's "painted ships upon a painted sea."

A group of flight officers and seamen on the deck of the U. S. S. Detroit. The author is the second from the left in the back row.

When all the other planes were in the air, we paired, and chased the torpedoes. It's very interesting to watch the shots from the air, especially those that start from the firing ship in a curve and then, as if endowed with more than human intelligence, straighten out and make for the target, going nearly thirty knots.

By the time the practice was finished, I had been in the air four hours, and rather expected to land alongside my ship and hoist aboard. But when I circled the ship, the signal read: "Proceed to Gonaives."

TWO planes going any distance over open water, fly together, and the senior aviator leads, so I fell in formation behind. Although neither of us pilots had ever been in that part of the World before, the observer in the leading plane had been to Gonaives many times.

After we had been on our way thirty minutes, I began to worry a little because we had not sighted a town. But I knew that Gonaives was both small and low, and since there were many sizable mountains along the coast I was cheered by the thought that it might be around the corner of the "next" mountain.

Twenty minutes more found us still with no sign of Gonaives Harbor, or even a cove of any sort. Things looked rather serious, for my gas was getting low and the wind had freshened to such an extent that landing in anything but a sheltered harbor meant the risk of a crack-up. I signaled to the other plane that I had twenty minutes of gas left. There was no reason to turn back, for we had not passed any favorable landing planes, and our hope lay ahead. We were then flying along one side of what seemed to be a bay, although it was quite wide and decorated at the time by waves of a size to make the North Atlantic jealous. Too, most of the coast was sheer and rocky, so that even a safe landing would leave little chance of saving the plane.

The next seven minutes were tremendously long, in that they gave me more than sufficient time to realize what a precarious situation I was in; but in so far as they represented gasoline time, they passed like a flash.

AS if in answer to an unvoiced prayer, a town and harbor suddenly came in view—just across the bay; about twenty miles distant. The leading plane headed for it immediately. I looked at my gas gauges. If they were right, I might just make it. With everything to gain and nothing to lose, I, too, headed across the bay. But those gauges of mine had been optimistic. I was about seven miles from either shore, with the town less than twelve miles distant when my engine stopped dead.

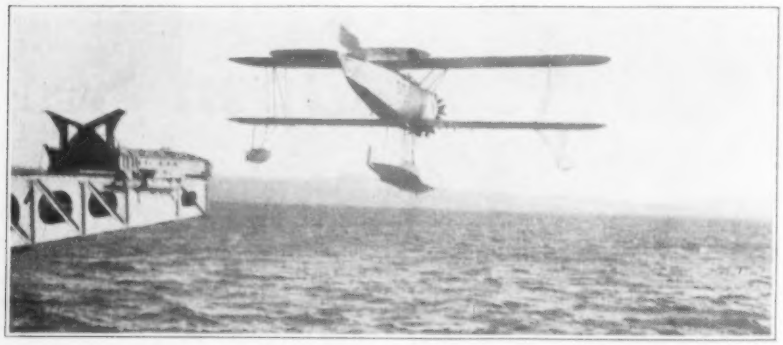
There was nothing for it. I had to come down, waves or no waves. By way of explanation, the main danger in landing on rough water is that when you first hit, a wave may knock you high in the air again and, having no forward speed and, consequently, no control, the plane may fall in on a wing and turn over. Or, you may hit so hard the pontoon struts break, or the float caves in. A lot of things can happen on rough water, and all are intensified when there's no gun to ease the plane down.

I nosed down, and attempted to stall about three feet above the water. We hit, and so did a wave. Thereupon, we shot into the air again. The way we landed from our involuntary hop would tell the story—we were lucky. When we hit again, the wings were level, and the pontoons undamaged.

There, so to speak, we were. Since the leading plane had seen us land safely, and could do no good were they to come down, the pilot headed for the town. They had catapulted thirty minutes after us, and the chances of making the harbor were in their favor. From there, they could dispatch help.

It was one o'clock when we landed, and the wind and waves were subsiding slightly, so we settled down to wait for the expected aid. There was really nothing else we could do, for the wind was blowing parallel to the shore line,

and away from the town, which my observer and I decided must be Port au Prince. We both sat on the pontoon and tried to paddle with seat cushions, but we made no effective progress toward shore. Our efforts were so futile that we abandoned them and amused ourselves by climbing on the upper wing and watching the sharks as they swam by and grinned at us.



Ensign Ward is being catapulted from his ship, the U. S. S. Detroit. It was in this plane that the author met with his harrowing experience.

We soon put a stop to their leering. We began to sing. Now I have often been told that if the worst came to the worst, I could always "keep the wolf from the door" by singing. Why not the sharks from the seaplane? It worked remarkably. We saw them no more after our first song. But the unpleasant feeling persisted that they were there just the same, and I knew that if anything happened to sink our plane, and we were forced to swim for safety, we could count on the sharks to take their revenge. Much later, when darkness closed in on us, and the waves got so high we almost forgot to jest, the thought of the sharks didn't seem a bit funny.

FIVE o'clock, and no indication of help on the way. We tried to be patient, but there was the lurking fear that the other plane had come to grief. We would have to do something to help ourselves. The wind encouraged us by shifting 180 degrees, so that while it would not take us in the direction of the shore, it would carry us closer to Port au Prince. With only a few hours of daylight left, we decided that our best course would be to rig a sail, and attempt to sail to the town.

But we were poorly equipped sailmakers. Then we thought of our parachutes. I unpacked mine, and with my companion's help, was able to rig a really effective sail by tying the shrouds to the various wing and pontoon struts. When the wind filled it out, it rested on the fuselage, just forward of the tail surfaces, and pulled us through the water—tail first, of course—at a fairly good speed. We were able to steer by putting our weight on the wing toward which we were bearing. That caused the wing tip float on the weighted side to submerge partially, turning the plane toward it. It was the improvised sail that saved the plane and its crew that night.

While we were rigging the sail, a steamer passed close by, but we were unable to attract attention. To the south, a plane was winging its way—too distant to sight us. Soon the cruisers would learn of our absence and begin to search, but we knew they could not get to us before dark, allowing that they headed directly to the spot. It was a nice feeling to realize that someone would look for us, but the thought of having about $80,000,000.00 worth of cruisers stop what they were doing and search for two young officers was enough to make those same officers rather nervous about what might be said when they got back. This despite their guiltless consciences.

WE WERE gaining on Port au Prince, with less than four miles yet to go—which we reckoned would take another hour—when nightfall overtook us. The wind stopped completely, and came up from exactly the opposite direction with disconcerting force. Good as our sail was, we could not tack against the wind with it; so the wind blew us around, away from Port au Prince and our fondest hopes—out to sea and its hazards. The wind changed many times that night, but it never blew toward either shore.

An hour later, and the wind had increased to nearly twenty knots, while the waves rose to heights of more than ten feet, running with the wind. It was our parachute-sail that kept us right side up, for it pulled us through the water so fast that the waves overtook us with much less force. When the end of a wing bowed to a wave, one of us would climb out on the high wing to keep the plane from upsetting, while the other steered.

There was a vast stillness that seemed to be mocking our efforts at preservation. The moon seemed to hang suspended from the clouds, much closer than any moon has a right to be. Then out of the monotonous panorama of sea and sky, there loomed a narrow, mountain-like Island, that appeared to rise straight up from the waters of the bay. Through long hours we steered for that land; *(Continued on Page 74)*

Model Tournament to Be Held in Atlantic City

IT ALMOST goes without saying that the coming Fourth Annual Miniature Aircraft Tournament to be conducted by the Playground and Recreation Association of America is of the greatest possible interest to the aspiring model airplane builder. The finals of this tournament will be held at Atlantic City, N. J. on October 10 and 11, 1930 at which time the winners of local competitions will compete for the title of national champion.

Contestants are to be divided into two classes; (1) JUNIORS who have not yet attained their sixteenth birthday on September 2, 1930, and (2) SENIORS who are past their sixteenth birthday but who have not yet attained their twenty-first birthday on September 2, 1930. There will be six events, three indoor and three outdoor for each class (Senior and Junior), and the announcements of those eligible to compete will be made on or before September 12 so that there will be a whole month to prepare for the trip to Atlantic City. Either boys or girls can compete, but no person will be allowed to participate who has received any compensation from his connection with model aeronautics later than April 1, 1930. Those who have received cash prizes in model aircraft contests, those who have received cash for demonstrating or selling models or compensation for teaching model flight or construction are not eligible.

Indoor events are for rubber powered models competing for duration, the greatest overall dimension not being greater than 30 inches. There are events for hand launched, rising off ground fuselage types and rising off water. One event is added to the above for the outdoor contests, models propelled by other motive power than rubber. All parts of these planes are to be built by the contestant, other than the bearings, gears, small metal fittings or the compressed air motors and tanks employed in the special outdoor class. The fuselage models must contain the motive power within the fuselage and double covered or hollow wings will be required. These fuselage types must have a landing chassis with one or more wheels in front and a tail skid at the rear. In the case of compressed air motors, a limiting maximum overall dimension of 90 inches will be permitted. Rocket propelled models will not be allowed to compete.

Boy's Model Used By Engineers

MODELS of the Lockheed Sirius, built by Bill Newman, a fifteen year old school boy of Hollywood, California, are so perfect that the Engineering Department of Detroit Aircraft are using them in planning the uses to which the large ship can be adapted.

Students Learn How to Drop Bombs

ADDING zest to the more or less monotonous routine of learning to fly, Penn School of Aviation, Pittsburgh, Pa., have offered a trophy for a student bomb dropping contest, which is being run off at the Pittsburgh-Butler airport.

Limited Commercial and Transport students enrolled with Penn School are eligible to compete. The contest is being run off on Sunday afternoons in relays of threes. Three students go up each Sunday with one "bomb," which happens to be a sack of flour in this case, and endeavor to hit the center of a white circle in the field. Only one shot is allowed. The three students coming closest to the mark will run off a final heat, the winner of the finals being presented with the cup.

Motorboat Launches Biplane Water Glider

GLIDING over water without a ground crew to work the shock cord recently became an actuality when Capt. Frank Hawks took aloft a new biplane glider.

No group of husky young fellows were present to launch the glider via the shock cord route. Nothing more than an efficient little sixteen-foot runabout which had a small winch and a thousand-foot tow line slipped over the transom of the boat.

Captain Hawks took his place in the forward cockpit of the two-place glider and fastened the towing cable to the bow. Then the boat, driven by one man and with one in the rear cockpit as a launching crew, got under way. About a hundred feet of cable was let out and the handle of the winch then held by the one-man launching crew.

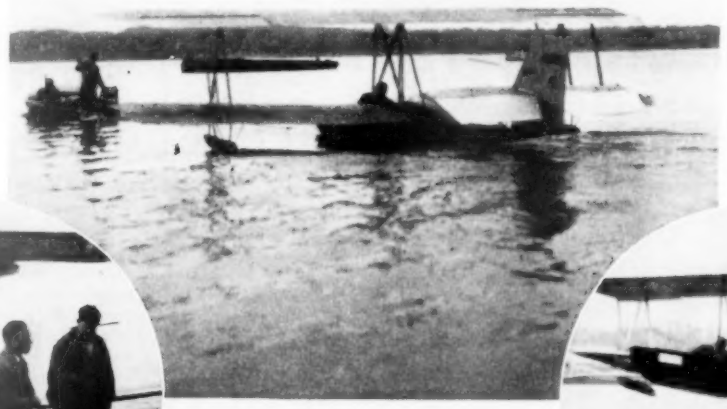
The glider was towed right off the pier on which it rested and after a short tow, more cable was let out and the glider began to take to the air. Five hundred feet of cable was let out on that first flight and Captain Hawks took advantage of all five hundred feet until the glider was flying directly over the boat at a speed of twenty miles an hour.

Then the cable was tripped and the captain glided down to the water in a long graceful flight. The height of this Peel water glider is regulated only by the length of the cable. It later demonstrated at Manhasset Bay that it was capable of making successful flights with a thousand feet of cable and took off down wind with two passengers behind a 40 mile per hour boat in a ten to twelve mile wind.

With a gliding angle of 18 to 1, this water glider is capable of gliding nearly 18,000 feet or nearly three and a half miles with a thousand-foot tow line. Landing levelly on the water, this glider has wing pontoons and a wing spread of 31 feet. It rides nicely on the water, the hull being built entirely of duralumin of two-step hydroplane design. It is a dual control job and the wing construction is of spruce spars and ribs with duralumin and linen covering. It sells for under $600, and it is rumored that a small motor may soon be had as optional equipment, making a tabloid seaplane in the thousand dollar class.

After Captain Hawks made his first solo flight at Manhasset Bay he took aloft an eleven-year-old boy who had never been in a glider before. The youngster got the feel of the stick on that second flight and then Capt. Hawks explained its workings to him. After that the youngster got in the glider, climbed two hundred feet and soloed.

And that's how easy water gliding is!



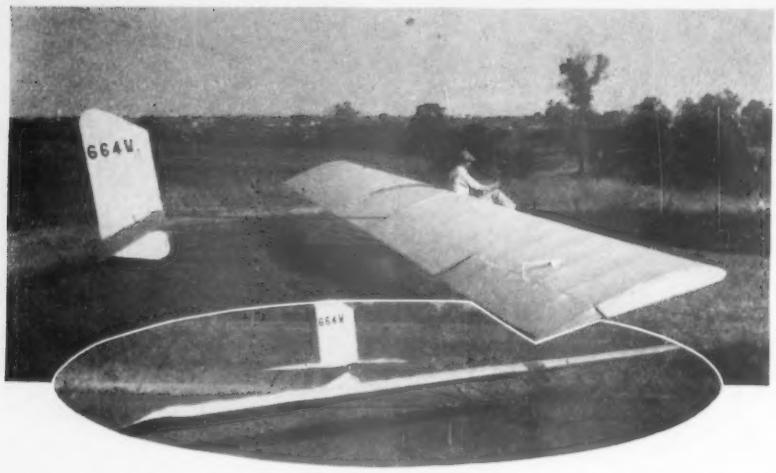
Left, Capt. Hawks picks a 12-year-old boy at random and shows him how to handle the water glider. Center, Capt. Hawks ready to take off from behind a 16-foot motorboat and a 1000-foot towline. Lower right, the Peel Water Glider is shown just leaving the water.

Naval Bomber Successfully Makes 6000-Foot Power Dive

A SHORT time ago Mr William H. McAvoy, Chief Test Pilot for the N. A. C. A., flew this ship, carrying a 1,000 lb. bomb in standard Naval bomb release to heights of over 10,000 feet, and then, placing the ship in vertical dives, dove repeatedly for distances of over 6,000 feet, pulling out of the dives in each instance with the bomb still in place.

Reports from the Naval Officials indicate that this ship promises to be one of outstanding value to the Navy in carrying out a new form of aerial tactics. These tactics consist of flying over an enemy objective at great heights, beyond the range of anti-aircraft guns. In a very few seconds, by virtue of a straight vertical dive in which the ship reaches full terminal velocity of over four miles per minute, sufficient altitude has been lost to enable the pilot to release the bomb carried with an almost certainty of obtaining a direct hit.

The fast little ship, when relieved of its bomb load, has the maneuverable qualities of a pursuit plane, and not only can easily outdistance any other types of bombing planes now in the military service, but can also, as shown by the tests, outclimb most of the pursuit planes now in active service.



New Metal Glider Features Midwing Design

DID you ever hear of a midwing glider? They have built one in Oklahoma City. The new "Aerobat" lays claim to this unusual and pleasing wing design.

The Aerobat has no wood in its construction. It is made entirely of aircraft steel dural and hib-lum covered with flightex fabric. It has an adjustable seat which provides for a perfect balance under any weight of the pilot.

Its specifications are: wing span 42 feet; chord 5 feet 6 inches; length 16 feet 6 inches.

The "Aerobat" has a 16 to 1 gliding angle, and a landing speed of 15 m. p. h. In its trial flight this primary glider gained over 300 feet altitude with 4½ minute duration, taking off at 12 m. p. h. by auto-tow.

The midwing glider is priced at $395. Pontoon equipment is optional at $100 extra.

Private Yacht Carries its Own Amphibion

THE most desirable yacht in America, according to most of us, is owned by Col. Edward A. Deeds. In fact, it is more than a yacht, it is an airplane carrier.

Col. Deeds is a prominent New York banker and is also an executive of United Aircraft and Transport. On the top deck house of his magnificent yacht, the "Lotusland", is room for nesting his Sikorsky 4-place sport amphibion.

His plane is powered with a Wasp, Jr. 300 h. p. engine and has a top speed of 122 m. p. h. His yacht is 207 feet long and carries a crew of 24.

In front of the Deeds home in Dayton, Ohio, there is a private flying field, and it is planned to fly from yacht to this home when in this vicinity, or when in the vicinity of New York to fly from the yacht to the New York Office.

And the List Is Still Growing

THERE are now nearly 12,000 licensed pilots, 8,500 licensed mechanics, and more than 6,600 licensed airplanes in the United States. Of the total number of licensed pilots, nearly 200 are women. There are four licensed women mechanics.

Stranded Farmer Gets Air-Cooled Tobacco

WHEN a man craves a smoke, there's no telling just what he'll do! And when a fellow's friend hears about it, there's no telling what he'll do!

It had been raining in the vicinity of Volga, S. D., for several days recently and the ground was pretty well saturated. The roads were impassable. One could go places by telephone, but, shucks, tobacco can't be delivered over a wire!

John Daum, a farmer living seven miles northwest of Volga, phoned to his grocer in that city and asked that some tobacco be sent him pronto. The grocer lamented the fact the roads were clogged.

"Guess you'll have to get along without tobacco over Sunday, John," he said back over the wire.

Roy Giard, who flies an American Eagle biplane around the Volga region, was in the store and volunteered to take the tobacco to Daum. He flew low over the house, dropping the package in the dooryard. Circling, Giard saw a dog run out, pick up the package and carry it into the house.

"John wouldn't even get his feet wet in the yard," Giard mused and headed back to Volga.

Five Sailors Form Private Flying Unit

FIVE sailors attached to the U. S. S. Omaha, snappy cruiser flagship of the United States Battle Fleet's Destroyer Squadrons, maintain that they compose the navy's first *unofficial* aviation unit.

The men are V. Gavenda, W. B. Steelman, W. T. Dahl, G. M. Panel and A. L. Gambo. They have organized themselves into the Blue Jackets' Flying Club, and own their private plane—that is, they will own it after all the payments are made.

Not so long ago these five men felt the urge to take to the air. But being battleship sailors and not members of the navy's aviation service it looked like their aerial aspirations would be indefinitely grounded.

Since a sailor's pay has limitations falling short of the necessary funds for individual flying lessons, the men pooled their resources, formed their flying club, and made a down payment on a three-place Travel Air training plane.

Every pay day finds them in the office of W. A. Speer, salesmanger for Airtech Flying Service, Ltd., San Diego, Calif., with a certain large portion of their collective semi-monthly incomes. It will not be long until they will have the plane with no installment collector to worry about.

The problem of flight instructions was solved with the help of several enlisted pilots of the Aircraft Squadrons, United States Battle Fleet, at North Island Naval Aviation Station. They take turns, during their spare time, coming to Lindbergh Field where the flying club hangars its plane, to give the club members lessons.

These five men are attached to the Battleship U. S. S. Omaha, but have found time to take flying courses, and money to buy a Travel Air.

All of the club members have soloed, although none of them had had flying instructions previous to acquiring their plane. Two members are ready to take Department of Commerce examinations for private pilot licenses. All five are out to get every flying license the department has to offer and eventually become accredited transport pilots.

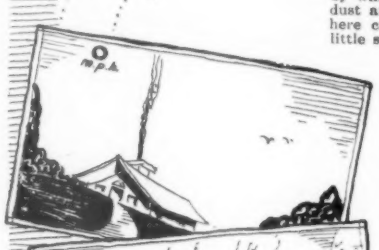
While three members of the club plan to enter civilian aviation as soon as their "hitch" in the navy is completed, the other two have their eyes on navy fliers' wings which they hope to win through training in their own plane.

The BEAUFORT WIND CHART

A Simple Way to Tell How Fast the Wind Is Blowing

There are plenty of accurate instruments for measuring the wind velocity—anemometers, wind gauges, air-speed meters and the like. All of these instruments are expensive and delicate and are therefore not always available to the amateur. What we need is some simple means of estimating the wind velocity.

POPULAR AVIATION, therefore, presents to you the BEAUFORT CHART OF WIND VELOCITIES. It is a simple method by which wind speeds are judged from the actions of bushes, trees, dust and similar objects always in view. The few rules presented here can be easily memorized and put into practice after a very little study.



DEAD CALM
0 M. P. H.
Smoke rises vertically—no motion felt on face.

CALM OR BREATH
1 M. P. H.
Smoke slightly drifts sidewise.

LIGHT AIR
3 M. P. H.
Smoke drifts about 45 degrees but motion is not strong enough to move leaves or vanes

LIGHT BREEZE
5 M. P. H.
Wind felt on moistened finger, leaves rustle, vanes show tendency toward moving, air felt on face.

GENTLE BREEZE
10 M. P. H.
Leaves and small twigs in constant motion, wind extends small light flags, smoke horizontal.

MODERATE BREEZE
15 M. P. H.
Raises dust and loose paper, small branches move.

FRESH BREEZE
21 M. P. H.
Small trees in leaf begin to sway, small wavelets form on ponds or lakes.

STRONG BREEZE
27 M. P. H.
Large branches in motion, whistling heard in telegraph wires.

HIGH WIND
35 M. P. H.
Whole trees in motion, difficult to walk against the wind.

GALE
42 M. P. H.
Breaks twigs off trees, trees sway violently.

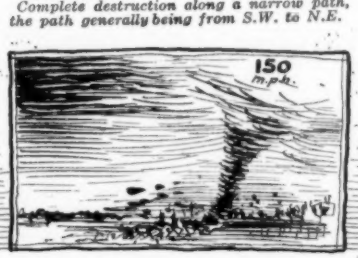
STRONG GALE
50 M. P. H.
Slight damage to buildings, weak signs blow down, loose shingles blow from roof.

WHOLE GALE
59 M. P. H.
Trees uprooted, considerable damage to buildings.

STORM
68 M. P. H.
Accompanied by widespread damage to buildings.

HURRICANE
75 M. P. H.
Great destruction to property with wind varying from left to right in 20-minute intervals.

TORNADO **150 M. P. H.**
Complete destruction along a narrow path, the path generally being from S.W. to N.E.



American Eagle Introduces Baby Brother

THE American Eaglet, a featherweight airplane for backyard aviators, has undergone successfully its flight tests at Kansas City.

It is a parasol type monoplane carrying one person with the Cleone engine and two with the Szekeley three cylinder thirty-five horsepower engine.

The American Eaglet will sell for $995.00 with the Cleone power plant, and $1395.00 with Szekeley engine.

The wings are conventional in construction. Ribs, both web and compression, are built up of spruce and plywood.

The fuselage is perfectly streamlined. A feature is the manner in which the lower longerons are brought together midway between the tail group and the nose as a single member. This further improves minimization of parasitic resistance. The fuselage is 23 inches wide, and is constructed of steel tubing as also are the members of the tail group. A door the width of the depth of the cockpit permits easy access to the pilot seat.

and the fin is rigid. An unbalanced rudder is used. The elevators are conventional in design.

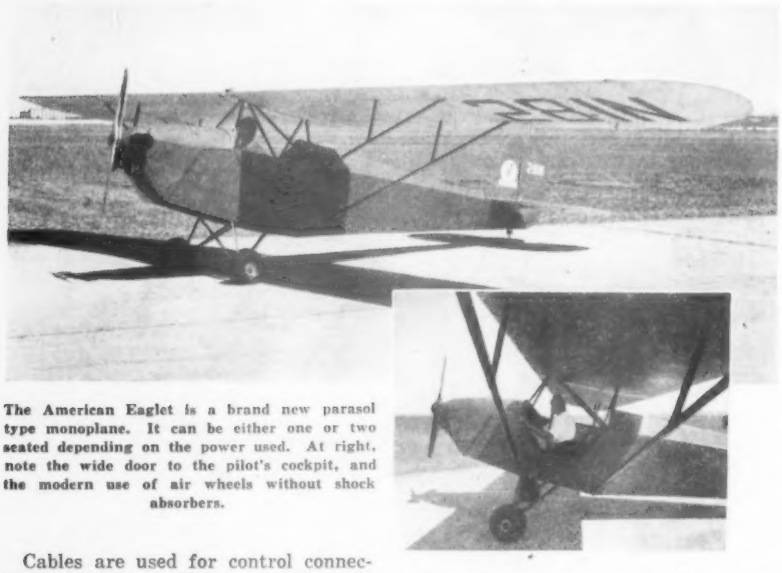
The wing span is 34 feet 4 inches. The overall length is 21 feet 6 inches. The height is 78 inches. Control surfaces and wing area include a total of approximately 164.4 square feet.

The gross weight of the plane is 580 pounds. The weight of the motor is 46 pounds; the propeller 4 pounds; the battery 15 pounds; and the fuel tank filled 36 pounds.

The weight per horsepower of the engine is less than 2 pounds. Ordinary motor car gasoline and lubrication oil are mixed in an 8 to 1 ratio and carried in a single tank built into the cowling directly ahead of the pilot.

A cowling door is built in to provide easy access to the ignition and carburetion compartment. The engine streamlines perfectly into the cowling.

Visibility is exceptional. The gap where the wings are fastened to the cabane section is covered with celluloid. This provides ample space for cable fitting access and inspection. Visible inspection plates are provided in the wings.



The American Eaglet is a brand new parasol type monoplane. It can be either one or two seated depending on the power used. At right, note the wide door to the pilot's cockpit, and the modern use of air wheels without shock absorbers.

Cables are used for control connections throughout. These run over pulleys and the aileron cable comes down over two auxiliary pulleys at either side of the forward section of the cockpit. There is nothing complicated about the control system. A comfortable aluminum seat is provided. It is fitted with an instantaneous action safety belt.

The landing gear is a conventional rigid inverted Vee type. It is equipped with 7x16 inch air wheels on four inch hubs. The landing gear is diagonally braced to further insure strength.

A shoe-equipped tailskid is employed. This ties into the stern post and rubber shock cord is used to give it springiness.

A wing tip aileron is used to provide maximum action. The horizontal stabilizer is adjustable on the ground

The Cleone motor gives the American Eaglet a speed of approximately 60 miles an hour at 2600 revolutions a minute. It lands at approximately 15 miles an hour.

The rate of climb is about 350 feet per minute, and the gliding angle ratio is 12 to 1.

The American Eaglet, Cleone powered, has been flown with pilot and passenger. In this test, the plane took off in 13 seconds.

Hands off flight with the American Eaglet proves the stablity of the craft. Wings depressed come back to normal flight position merely through the use of the rudder. The nose returns to normal flying position of its own accord, either from a stall or a diving angle.

Economy of operation is one of the features of the new American Eaglet. Using less than two gallons of fuel an hour the cost of operation for an hour will be less than 50 cents. This will make the cost per mile less than one cent.

Is Your Glider Eligible for License?

THREE classes of gliders will be considered eligible for license by the Department of Commerce. The three classes are:

1. (a) Gliders manufactured under Approved Type Certificates. This corresponds to the present procedure involving the licensing of airplanes which are built under Approved Type Certificates.

(b) Gliders constructed by any one, provided they are built in accordance with specifications and designs which have been previously approved by the Department of Commerce.

2. Gliders not manufactured under Approved Type Certificates but which meet the requirements for such a certificate.

3. Gliders not included in either class 1 or 2 will be eligible for license provided they pass a visual inspection by the Department of Commerce as to design, materials, workmanship, and flight characteristics, and provided they are manufactured prior to October 1, 1930.

Gliders under Class 1 (a) are those manufactured in quantities by holders of Approved Type Certificates for the type of gliders they are building. Such gliders shall be exactly similar in specifications, design and workmanship to the type approved by the Department of Commerce.

Gliders under Class 1 (b) are those manufactured by private owners or others who have followed previously approved specifications and design, such as gliders manufactured from the drawings of an approved type glider, provided, of course, the holder of the Approved Type Certificate sees fit to distribute such drawings.

Gliders manufactured under Class 2 are those which meet all of the minimum requirements for an Approved Type Certificate, but for which a Certificate is not desired because quantity production is not planned.

Gliders under Class 3, include those built by individuals and clubs with or without previously approved designs, provided they have been manufactured prior to October 1, 1930. Their eligibility for license will be determined by a visual inspection of the design, materials, workmanship and flight characteristics according to a "rule of thumb" method which has ben devised by the Department. Gliders so constructed after October 1, will not be considered eligible for license.

THE $125.00 AIRLINE

An ingenious New York lad discovers the way to start a sightseeing service on a shoestring

Left, Bernard Capehart (right) and his assistant, Eddie Sampers. The shack and signs you see here cost $120. The rental of the pier space cost the other $5.

Above, An Ireland plane similar to the ones used by Capehart in his flying service.

Right, The pier from which the Riverside Air Service operates. Note that a gangway leads down to a float and a motorboat. The boat is hired by the day and carries passengers to the waiting seaplane.

CAN a successful flying service be started with a total capital of less than a thousand dollars? Sounds like an impossibility in these days of million dollar airports and expensive airplanes. Yet Bernard Capehart, a red-headed youngster of twenty-four, started the Riverside Flying Service right in New York City with the sum of $125 and a whole lot of nerve.

The $125 is easy to itemize . . . and so is the nerve, once you have met young Capehart. For of the money and the nerve, the latter was more important in the establishment of his flying service.

Surrounded as it is by airports, New York City has no airways directly in New York City. Bernie Capehart felt that if there was only some way to establish a base on Manhattan itself, the rest would be easy. With land valuation extremely high he quickly came to the conclusion that he would have to use seaplanes if anything.

After several days of scouting around the water front, he came upon a city pier at 155th street and the Hudson River. A steamer had sunk alongside that pier some years ago and the pier was virtually abandoned.

Enthusiastic over his find, Bernie rushed down to the Dock Department and leased sufficient space to erect his flying office on the pier at the price of *$5 a month right in New York.* There was a joker in this, however, and that joker was in the form of the Riverside Drive Taxpayers Association who had successfully fought all efforts thus far to establish a flying base.

Bernie, however, was equal to the occasion. Instead of fighting the Association he appealed to it. Getting up an attractive little card to distribute in the homes of Riverside Residents, he informed them that "There's a baby on your doorstep . . . will you take him in? Flying is young and needs encouragement. If we make any noise which you think is unnecessary or which annoys you please do not hesitate to tell us and we will immediately remedy it." In evidence of his good intentions, Bernie restricted flying hours to between 9 a. m. and 7 p. m.

WITH a location made ready, Bernie's next step was to acquire 'planes. You can't buy 'planes with what you have left over from $125 after erecting a shack, and so Bernie used nerve. He made a canvass of pilots who owned their own ships and finally settled upon two flyers in Long Island who possessed Ireland seaplanes. To them he put the proposition: "I've got a peach of a location. I can get the crowds and do the balyhoo. We'll fly 'em at $5 a head and split 50-50."

The pilots, young fellows themselves, were impressed with Capehart's earnestness. They signed on the dotted line and the Riverside Air Service acquired two seaplanes. A week before Decoration Day with the fleet in town and the Drive crowded, Bernie decided that the time was ripe to inaugurate his flying service. His hunch was right. That first day without any advertising whatsoever, he flew forty-five passengers at $5 a head.

He acquired enough money to buy a few floats which he uses to embark his passengers and there is plenty of parking space for their cars on the pier. Curious spectators who stray down from the Drive to survey the 'planes are exhorted by Bernie to "take a 'plane ride and have the dust blown off your whiskers" and many of them do.

Not satisfied with drawing his patrons merely from the spectators, Capehart has negotiated with a sightseeing bus company that will take passengers to him directly from Times Square . . . and he has made a few connections with hotels, too.

The pilots are satisfied that they are taking in more money than they could individually with their own efforts and as for Bernie . . . he's looking forward to an eminently successful season. And what more can you expect for $125?

How Much Does It Cost to Fly?

Which is the cheaper to run, the Automobile or the Airplane? A comprehensive survey shows that the lightplane can be operated for half the cost of a low priced car

"HOW much will it cost to fly?" is the very natural question that is leveled at the aeronautic industry daily ever since the inception of the airplane, and necessarily this is a perfectly legitimate question for the prospective purchaser to ask even though it is difficult to make a broad comprehensive answer that will embrace all activities. Inevitably, it is also necessary to make comparisons between the relative cost of automobile and airplane operation which is a simpler question to answer because nearly every man is more or less acquainted with the maintenance of his family car, his poor neighbor's car and his rich neighbor's car.

To begin with, we must consider the type of plane and its size just as we make comparisons between the operating expense of a flivver and a car of the Lincoln or Pierce-Arrow type in automobiledom. A two-seater training type plane equipped with a 90 horsepower motor will obviously be cheaper to operate than a Ford Tri-Motor transport equipped with three 425 horsepower Wasps, and a lightplane or converted glider equipped with 35 horsepower will cost less than either of the other ships. The large ships not only take more fuel but the fixed charges such as depreciation, insurance, overhaul and hangar rent increase in proportion.

Airplane operation may seem excessively expansive to the average automobile owner for the reason that he seldom takes all of the automobile charges into consideration. He is usually content with adding the gasoline, oil, repair and garage bills together and calling this the expense of operation which is far from the truth. He omits items such as insurance, depreciation, interest and taxes which are by far the greatest expenses concerned with an automobile if his yearly average mileage is below the normal of 10,000 miles. Taking all of the expenses into consideration, it is seldom that a city man can operate even a low price car for less than 10 or 11 cents per mile, while cars selling above $1,800 will run from 12 to 25 cents per mile without a chauffeur. Think this over for a minute and we will proceed with the next comparison.

Certain automobile expenses, such as gasoline, oil and tires, increase in direct proportion to the daily mileage, while the fixed charges per mile decrease as the annual mileage mounts up. The more expensive the car, and the greater the fixed charges, the greater must be the mileage to hold down the cost per mile. It is therefore evident that there is one definite yearly mileage that is most economical for each type of car, and for cars costing $1,500 and less, this is approximately 10,000 miles per year. Driving only 5,000 miles per year results in almost prohibitively high fixed charges while the cost of gasoline and repair expense is only very slightly reduced. Gasoline and oil are not very important factors. Calculated on the basis of a $3,000 car, the average cost per mile will be from 15 to 18 cents per mile without chauffeur or as high as 50 cents with a chauffeur.

Now let us consider the cost of running an automobile on an hourly basis. At an average speed of 20 miles per hour, and a total of 10,000 miles per year, this will account for 500 hours driving time per year. It costs about $1,000 per year to operate a light car in Chicago, including the fixed charges, so that we immediately arrive at a cost of $2.00 per hour for each hour this car is on the road. This is based on garage rental at $15.00 per month, interest at 6 per cent and trade-in every three years at 30 per cent of the cost. This will rather astonish those who have not kept books on a car, and it will be more of a surprise to folks who only drive 200 to 250 hours per year. On the same 10,000 mile basis, the cost of operating a $3,000 car will average $3.00 to $3.50 per hour, without a chauffeur, or about 15 cents per mile.

HAVING disposed of automobile operation we will take up the case of the airplane based upon exactly the same conditions and therefore directly comparable with the automobile. In the latitude of Chicago, and in the majority of Northern states, we can safely estimate 100 good flying hours per year for the average private pilot who is generally a fair weather pilot. At an average speed of 100 miles per hour this will run up to 10,000 miles per year total, just as with the automobile. To carry this comparison further, we will assume a typical three-seater plane (pilot and two passengers) equipped with a 90 horsepower engine and costing $3,000.00.

Charged up against the operation of this plane are the following expenses, based upon a fair average and tending toward the safe side rather than otherwise. Please remember that we are considering a plane costing $3,000 and therefore the comparison of costs is to be made with the $3,000 automobile and not the flivver.

Airplane Operation in Dollars Per Hour (City Conditions)

Gasoline	$1.40
Lubricating oil	.20
Engine field service	.10
Engine overhaul (@100 hours)	.75
Hangar rent including field	2.20
Totaling operating expense	$4.65

Fixed Charges

Depreciation	$2.55
Insurance	2.67
Total fixed charges	$5.22
Total Cost Per Hour (100 miles)	$9.87

Thus, the cost of operating the airplane is slightly less than 10 cents per mile against the 15 cents per mile charged against the automobile. The total cost per hour is considerably greater, but then we travel five times as far in an hour while our hourly charge is only three times greater. In short, an airplane is the cheaper of the two vehicles when we have a definite destination in view or when we wish to cover a given number of miles. Where time is of primary importance the plane is ultimately superior to the car.

Now let us get down to the case of the man with an average income, the man that is the patron of cars costing $1,500 and less, and see how the airplane applies to his conditions. For the comparison we will quote an airplane listing at $1,500 equipped with a 35 horsepower engine and capable of 100 miles per hour as before.

Lightplane Operation in Dollars Per Hour
(Cost $1,500)

Gasoline	$0.70
Lubricating oil	0.10
Engine overhaul (@100 hours)	0.20
Hangar and field rental	1.20
Totaling operating expense	$2.20

Fixed Charges

Depreciation	$1.18
Insurance	1.30
Total fixed charges	$2.48 $2.48
Total Cost Per Hour (100 miles)	$4.68

Here we are down to 4.68 cents per mile against the average of 11 cents per mile for the small car and flivver, or considerably less than half the cost for travelling between two points. It is cheaper than a whole lot of things that the average man spends money for nowadays—cheaper than taking the girl friend to the show for example.

If this man will overhaul his own engine at the end of every 100 hours, which he probably will do, and if he can get a friendly farmer to rent him space in his barn for two or three dollars per month, the cost will be materially reduced. It is not impossible, by a little scheming, to get the total cost down to $3.50 per hour or 3.5 cents per mile, still carrying insurance as before. If the insurance is dispensed with then our operation will be very much lower, but try as we may, we can never lose our old and staunch enemy—depreciation.

Air Passengers Hear Radio

Sight-seeing planes of Curtiss Airplane Service Co. are now equipped with radio for the entertainment of passengers.

Modern Executive Dictates Letters While Flying

THE business man who is compelled to travel by airplane from city to city can now dictate his correspondence while in flight. Such is the experience of J. H. McDuffee, general manager of the Prest-O-Lite Battery Company. While he is traveling 120 miles an hour in his new plane he is busy handling office matters.

He has worked out probably the most unique system of this sort used by any executive today. The plane is equipped with a dictaphone, making it unnecessary to carry a secretary with him on his trips. As each record is completed, it is attached to a small parachute, and while the pilot flies low over a golf course or other open space where people are to be seen, he drops it with a note attached asking that it be placed in the mails.

Top, Interior of well-equipped flying office. Center, View of the Mahoney Ryan used by Mr. McDuffee. Below, Mr. McDuffee is shown dictating his correspondence. When finished he places dictaphone cylinder in a specially constructed carton, addresses it, and throws it out the window.

A special carton has been developed that insures that the record will reach the ground without being broken. The package is addressed with proper postage and special delivery stamps, to the central office, so that it is only necessary for the person finding it to place it in a mail box. When the record reaches the office it is written on special stationary, marked, "Dictated aboard the 'Vision of Prest-O-Lite'."

The cabin is so built that the noise of the motor and propeller does not affect the dictaphone.

Six Men Join Caterpillar Club

WHEN one of the propellers of a trimotored Army Fokker Transport broke, six army men "bailed out" in rapid succession. Five went through the side door of the plane and one went through the trap door. In doing so the latter skinned his nose. Lieut. W. A. Maxwell, Air Corps, who piloted the Transport from March to Mather Field, stated:

"Everything was going smoothly until we neared Fresno. Suddenly, what I at first thought was the left propeller, broke off. I throttled down the motors from left to right, but by the time I discovered that the right propeller was gone, the right motor had virtually torn itself to pieces and the plane was jumping badly. I saw that a forced landing in a vineyard was coming and told Sergeant Arthur, who was in the pilot's cockpit with me, to tell the other men to jump. Arthur opened the door to yell to them, but they had already sensed what was coming and the last man was just disappearing out of the door. I then told Arthur to jump, too, as we were due to crash. Arthur said 'No,' and stood by. I tried for an open space in the vineyard, but couldn't quite stretch the glide to make it, and we piled up in the vineyard. I don't understand why something didn't hit us in the face; things were certainly flying around in the front cabin."

Aeronca Seaplane Passes Performance Tests

ALL Aeronca land planes are convertible into seaplanes with the addition of a few very minor fittings. The front struts joining the pontoons to the fuselage are attached so that they are practically an integral part of the fuselage design. The same connections which hold the flying wires hold the lower struts while the tubing which carries the wing attachment also carries the top front strut attachments. The rear pontoon struts come up at an angle, and are fastened to the outer longeron of the "Y" forming the fuselage structure. Additional bracing wire is attached to the joint of the axle clamps.

The speed is just slightly less than that of the land plane. Speed tests were conducted the following day against a land plane and showed about two miles an hour less at top speed. The top speed of the land plane is indicated at 85 and the seaplane at 80 miles an hour top. Cruising speed is just a bit better than 60 miles an hour at 1900 r. p. m. No altitude tests have yet been attempted.

The launching of the Aeronca seaplane took place during the first week in June on the Ohio River at Cincinnati. A test was made early in the morning, at a time when the river was very smooth and the air was absolutely still. The Aeronca's test pilot, Fred Fluck, had never flown a seaplane before—in fact, hadn't even seen one take off. After the motor was warmed up he headed out toward the middle of the stream and pushed the throttle about half way forward. He taxied this way for about half a mile at a speed of approximately twenty-five miles per hour. Then he turned around and pushed the throttle full forward as stop watches were clicked to clock his take-off time. The Aeronca immediately gained speed and it was necessary for the pilot to push the stick a bit forward to keep it from rocking back on the steps before flying speed was attained.

To the surprise of everyone, it took off with a very short run. The stop watches showed seven seconds—in spite of the unrippled water and the dead air. He landed again immediately to familiarize himself with seaplane landings and then swung around for another take-off. This time he climbed to a thousand feet in a little less than three minutes and to two thousand in approximately six minutes. His first bank was a little shallow but his second was practically vertical. During the next few minutes he was doing reverse turns, wingovers and vertical stalls. The ship behaves exactly like the land wheel job. Before the day was completed about forty hops were made to the intense interest of everyone in the vicinity. In the afternoon the water got very rough because of a snappy wind and the violent churning of the many speed boats on the river. It did not affect the ship a bit except to make its take-off easier. The pontoons ride the waves well, the ship can be turned around at maximum taxiing speeds without the slightest sign of wing tipping, and landings are executed with utmost ease.

The pontoon equipment on the Aeronca consists of twin floats approximately ten feet long. The total weight of the pontoons and attaching struts and wires is 103 pounds. The total weight of the ship empty with pontoon equipment is 470 pounds. With pilot, gas and oil, total weight is 696 pounds. With a 135-pound passenger and 160-pound pilot, the take-off was accomplished in twenty seconds after about twice the run.

The Aeronca pontoon job is priced to sell at $1995.

Aerial Ambulance for Hire

THE first commercial aerial ambulance—one that will speed through the skies at 150 miles an hour—was placed in operation recently. It is owned by the California Aerial Transport and will be kept on call at the company's hangar at Los Angeles Municipal Airport.

When patients must be carried to hospitals or taken home to distant points and are not able to stand the jolts of a ground vehicle, the flying ambulance, a Lockheed-Vega with 425 horsepower Wasp motor, will be called into service.

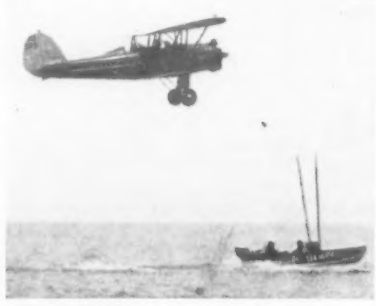
The equipment is in the closed cabin of the plane—form-fitting bed suspended from the roof so that it will remain level during flight, emergency medicine kit and room for pilot, doctor and nurse.

Use Gas to Extinguish Fires

"THERE can be no combustion where there is no oxygen," declared Alfred Schwartz, during a successful demonstration of his new fire-prevention device for airplanes.

Before a group of interested spectators, Mr. Schwartz showed how his invention utilized motor heat to generate a gas which drives oxygen away from the motor. The gas used is carbon tetrachloride and a small pressure tank is sufficient to ward off fire for twenty minutes after landing. It is not a new gas, but this application of its use is.

Mail Picked Up from Speeding Boat



THE first airmail pickup from a speeding motor boat was successful on first attempt at Detroit recently. Photo shows Howard Hartung, Detroit flyer, overtaking the outboard boat speeding forty miles an hour just before the contact was made. The hook on the dangling rope caught up the rope stretched between the two poles on the boat, and the mail sack was lifted into the plane. The pickup idea was proposed by Dr. Glenn Elliott, Detroit aviation enthusiast, who believes that small towns on navigable water can be given benefit of airmail service by this device.

A Simple Way to Plot Your Course

By CAPT. CHAS. W. PURCELL

It doesn't take a navigator to row across the Hudson River. Neither do *you* have to take a course in Aerial Navigation to fly from city to city

TO EACH amateur pilot comes the longing to be able to plot his own course, just as Mariners do at Sea. This idea usually takes him to one of the said 'old time Mariners' and he is soon all mixed up with Sidereal time, Azimuths, Artificial Horizons, Declination, Variation, Deviation, and a few thousand other Nautical Terms.

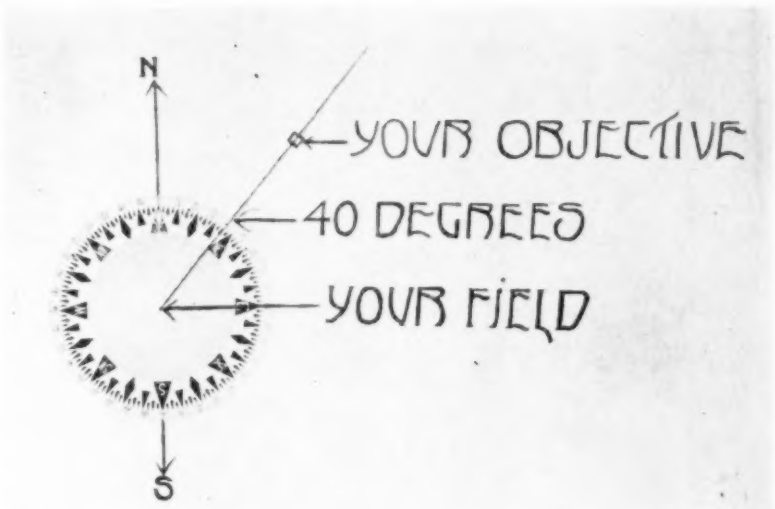
The amateur pilot frequently loses all longing to plot his own course, and continues to fly by dead reckoning. Strangely, only two of the conglomeration of words written above are necessary in the plotting of a course from city to city.

By "dead reckoning" we mean that other undescribable sense given to us by nature, and which some of us have in large quantities, and others very little. This sense of flying by dead reckoning can be cultivated, after a pilot has learned the drift of his ship, in winds of various speeds. After it is all boiled down, sense of direction is dead reckoning. Sense of direction is usually the result of many flying hours, so the more flying time a pilot has, the more sense of direction he will accumulate. This is sometimes called "flying sense" for want of a better name, and it seems to cover the case fully.

The men who completed the Pacific Flight (or Massacre, whichever you'd like to call it) to Honolulu, claimed that "dead reckoning was the main factor in the successful termination of their journey. For hours the navigators of these flights claimed that no "sights" could be taken, due to clouds and numerous other reasons. They were at times compelled to fly under a two hundred foot "ceiling" which cut off any chance for a "shot" at the stars. During this time the old standby "dead reckoning" was their only resource.

Plotting your own course is not as hard, in fact not five per cent as hard, as the average young pilot thinks. A good map and protractor are the only necessary "instruments." The map should show townships if possible, although this is not absolutely necessary. This map should have a line drawn through your field site, showing true north and south. Make this line long enough so that it will extend beyond the outer edges of your protractor. Now, from any source you may wish to obtain it, find out the Variation of the city in which your field is located.

The protractor can be obtained for a few cents from any supply house selling nautical instruments (illustrated). Now that you have the above "instruments" we will demonstrate just how easy it is to plot your own courses.



Capt. Purcell has given us this illustration which describes graphically a very simple method of plotting a course to your destination.

WE will have to assume that your ship has been "swung," that is, that you have had your compass adjusted, and that you have a Deviation Chart showing the number of degrees your compass prevaricates. Deviation is the deflection of the compass needle from the Magnetic Meridian, caused by some local attraction in the plane you are flying. Deviation changes as the direction of the plane's nose changes, that is why you will receive a chart when your ship is swung.

At the center of your protractor you will find a small hole. Tie a knot in a piece of string, or thread, and run it through this hole, placing this hole directly over the spot occupied by your field on your map, with the North and South line running through these points on your protractor. (Illustrated). Now that we have the protractor in position, our string is coming from the field in which we are located. Holding the protractor with one hand, we draw the string fairly tight and place it over the city you wish to fly to. Now read the number of degrees, at which the string crosses the outer edge of the protractor.

We will say it reads forty degrees. The variation of the field from which you are flying is supposedly twenty degrees easterly. Twenty from forty leaves twenty. Why do we subtract the Variation? In plotting any course you always subtract EASTERLY and add WESTERLY Variation and Deviation. With our variation taken care of our course now reads twenty degrees.

Now we consult our Deviation Chart and find that on this Course our deviation is ten degrees Westerly. Adding our ten degrees Westerly to our twenty degree course we find our Magnetic Course, or that Course we will fly on our Compass, is thirty degrees.

Each number on your Aviation Compass corresponds to ten degrees on a Mariner's Compass, so our reading on our Aviation Compass will be Three. By adding a naught to any number on the Aviation Compass you get a mariner's reading.

There you have the whole thing in a nutshell. Once you have computed a couple of these examples, you can plot your course to any city in the country.

A FEW more factors enter into a good course plotting. One, is the drift of your ship, and the other is, returning on your course to your starting point.

You can figure the drift of your ship, after you have flown a couple of courses, under various conditions, such as, with the wind against the wind, and with and against different wind speeds. With the following fixed firmly in your mind, you will have a good starting point from which to estimate your drift.

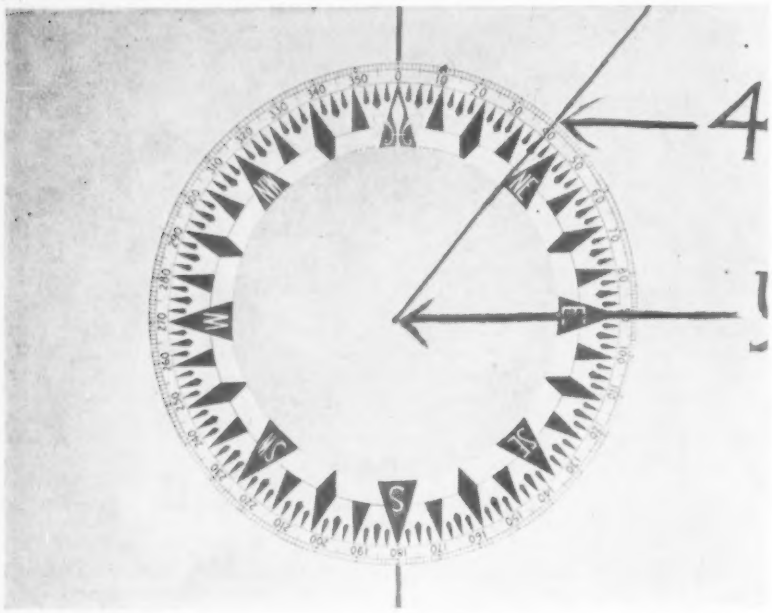
With a Ship Capable of Making 90 M. P. H.—Drift Per 100 Miles—15 Miles.

With a Ship Capable of Making 100

M. P. H.—Drift Per 100 Miles—12 Miles.

With a Ship Capable of Making 120 M. P. H.—Drift Per 100 Miles—8 Miles.

Flying cross wind, add twenty-five per cent of the speed of your wind to your drift. A tail wind will invariably reduce your drift between three and four miles in every hundred, because of the greater speed at which your ship will travel.



A close-up view of the protractor which can be secured for a few cents from any supply house selling nautical instruments.

These are approximate figures against a ten mile wind. The writer has kept a record of every cross-country trip he has ever made back as far as 1916 and has compared the findings of these trips with mail pilots on the Pacific Coast, and they have been found to be fairly accurate. The above figures are not to be used on tri-motored jobs. They are for two place Monoplanes and Biplanes.

The writer tried to get a set of drift figures to fit the tri-motor jobs, but the wide variety of differences made this impossible. Several trips were made in tri-motored jobs, but the writer gave it up as a bad job.

Once you have found the drift of your ship under varying conditions, place your string the number of miles away from your destination that you expect to drift. In this way you can take care of your drift from the start.

To return on any course you simply add eighteen to your original course, taking care of the difference in Variation if any.

Two words in this article may confuse a young pilot, just as they have confused others. These are Deviation and Variation. Variation is the angle at the observer position between the true Meridian, and the Magnetic Meridian. This is supposed to be caused by mineral deposits located in the earth that detract the needle of the compass from pointing North.

Deviation is caused by local attraction, something in the ship you are flying. This Deviation will be found to vary with the different speeds of your motor. This is caused by a leakage of current from your Magnetos. Sometimes wrist watches will change this Deviation three or four degrees. When you have someone swing ship for you it is a good idea to put everything into the cockpit that you intend to take on your trips with you. Don't have your ship swung and then put in several more instruments, if you do this, your Deviation Chart will be useless.

Department Store Sells Airplanes

THEY are now selling airplanes in the Selfridge store, London's leading department store.

"Flying for sport is so popular in England that the Selfridge store has found it profitable to establish a permanent airplane department," Mr. Selfridge said, "The department was opened late in March and sold three planes the first day and eight during the next fortnight. English, German and Italian models are displayed in the department, but no American-made planes. The price range is from $2,800 to $4,000, and the ships are of sizes to accommodate from one to ten passengers."

Mr. Selfridge is himself a licensed pilot.

How to Fly the Hang-Glider

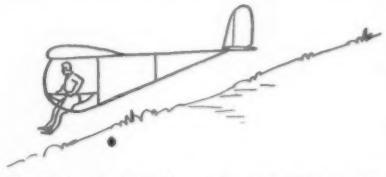
The pilot stands between the armpieces and rests on a strap slung between the cross-bars.

THE HANG-GLIDER is a German type glider which is controlled by shifting the weight of the body. It derives its name from the fact that the pilot literally "hangs" from the glider. This type was in frequent use by the early pioneers of aviation, such as Lilienthal, Maxim, Langley, Chanute, and the Wright brothers.

The GLIDE-AIR is an American make of hang-glider. It weighs less than 40 pounds, will take off at 5 m. p. h. and has a landing speed of less than 5 m. p. h. The simple craft is all metal construction with a modified Gottingen fabric covered wing. It is rudder controlled, operated from handle bars in the "cockpit."

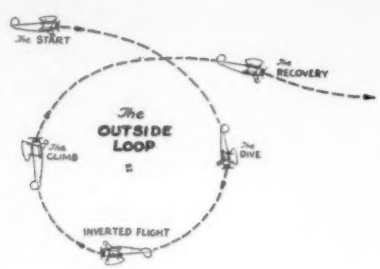
The pilot stands between the armpieces in his harness as shown in the illustration. The flight should be made from a slight hill. The pilot then runs down the slope at full speed, and when he feels the ship raising from the ground, he swings his legs back. The legs swing back almost of their own accord and the pilot thereby moves back the center of gravity and elevates himself.

The glider is held in the air with the wing profile pointed downwards. To steer down, the pilot swings his legs backward and his body forward (the reverse of taking elevation). In turning or banking, the pilot uses his body as the stick, and controls the rudder with handle-bars.



The pilot uses his body as the stick. He secures elevation by swinging his legs forward and his body backwards.

In landing it is important that the pilot throw the upper part of his body backward, for the leading edge raises itself and checks his forward motion. Since there is no landing skid on a Hang-Glider, a careless landing puts quite a strain on the pilot's legs.



How to Do an Outside Loop

Two Famous Record Flyers, Tex Rankin and Phil Love, Explain Some of the Intricacies and Sensations in Performing the Most Difficult Maneuver in Aviation

Tex Rankin's record of 19 loops was broken five weeks later by Dale Jackson of endurance fame with 36 loops. On the same day Jackson lost his record to Paul Mantz who made 46 loops.

HOW are outside loops made?" is a question frequently in the minds of those interested in aviation. Here's what J. G. "Tex" Rankin, who recently made 19 consecutive loops, for a new record, has to say:

"There are no rules regarding the establishment of a record for outside loops, so when I set out to 'try my luck' the local contest committee, consisting of Captain French, Lieut. Smith, Lieut. Clark, and Vance Breese (who were appointed by the President of the Portland Chapter of the National Aeronautic Association), made up a set of rules covering such a contest.

"The rules in part read that the plane would have to start a dive from a level flying position without first stalling the plane. The motor could be on or off. The pilot would continue in the dive, pushing the stick forward until the plane was on its back, then continue pushing the stick forward until the plane came out level on top in a direction not more than thirty degrees off from the direction in which the dive was started, without stalling or falling off to either side, but continuing a straight flight. There should not be more than two minutes interval between each loop.

"Although I made thirty-four outside loops in a total elapsed time of 50 minutes without stalling or falling off on any of them, I was granted only nineteen by the committee. This was due to the fact that I came out slightly more than thirty degrees off on the top of fifteen of these loops, which was caused by the difficulty I experienced in keeping my feet on the rudder—there being no straps provided for this purpose.

"I found that my best loops were made by starting from level flight with the stabilizer set clear down to make the ship nose-heavy, with the engine wide open, and making a dive of 3000 feet around an arc of 1500 feet, and coming up the other side in the same manner. My net loss on altitude was about 500 feet. I also found that if the ship was pulled into a stall before starting the dive that it usually resulted in a sloppy loop. This also occurred if I did not allow the plane to come up high enough before leveling off. In other words, if I dived 3000 feet and tried to level off with a new loss of 1500 feet in altitude, it would cause the ship to roll on top of the loop. I experimented on outside loops for several weeks before attempting to establish a record, gaining much useful information from these experimental flights.

"I carried a parachute, but no other safety belt than the regular standard one that was already provided on the ship. I experienced nothing unusual while doing these loops, and I feel that anyone with sufficient flying experience—and particularly with experience in inverted flight—would have no difficulty in making as many outside loops as I did, or even more, providing of course that he be in good average physical condition and use a strong, well-made ship."

THE outside loop is probably the most exciting and hazardous stunt known to flying. It is so called because the pilot is on the outer rim of the loop during the maneuver instead of on the inner side as in the ordinary loop.

Lieut. Phil Love, flying partner of Colonel Lindbergh's on the air mail run, has the honor of being the first to do an outside loop with a passenger. The plane used was a tapered wing Waco, powered with a J-6 seven-cylinder motor, but the ship was not quite standard in every respect. An auxiliary tank was built into the landing gear, in order to furnish gravity flow to the carburetor during inverted flight. In normal flight this tank is filled by gravity from the main tank but when flight is inverted a check valve stops the flow back to the main tank, allowing the gasoline to run only to the carburetor. All of the oil breathers are taped up and the main tank is vented through a long pipe to the landing gear so that when inverted the top of the vent is above the main gas tank level.

A tapered wing Waco, similar to the one used by Lt. Phil Love, is quite capable of difficult maneuvers as shown by this unusual action photo.

Shortly after landing from the loops Phil gave a report on his experiences. He said that there was very little experience while actually undergoing the loop itself.

"I have experimented with several different ways of executing them," he continued, "I have tried stalling into the initial dive both with power on and with power off, and with different stabilizer settings, but I find that the most satisfactory way is to set the stabilizer very slightly nose-heavy, and to fly the ship into the dive with power on from cruising speed.

"It takes quite a bit of determination to shove the stick forward until the nose is straight down, and then keep shoving it forward until the ship is horizontal on its back. The execution of the remaining portion of the loop is the most difficult, for after the nose has risen above the horizon there is no reference point to level the ship by, and it is at this point that the pressure tending to throw the pilot out of the cockpit is greatest. In addition to this centrifugal pressure which is aided by gravity it is necessary to apply no little amount of forward pressure on the stick to force the ship up and over the top.

"I find that going up the back side of the loop the ship has a tendency to rotate and care must be exercised to prevent this. The horizon is visible out of both sides of the cockpit, but I have never been able to tell much about the attitude of the ship by looking at it in this position. I find it more satisfactory to make sure that the ship is absolutely level at the bottom of the loop while the horizon is visible and relative to the wings, and then to shove the stick exactly straight forward to prevent turning with the ailerons, and carrying just enough rudder to counteract 'torque.' If this is done correctly the chances are that the loop will be completed with the wings level, and the ship flying in the same line as when the loop was started.

"The Waco Taper wing does its best

loops starting with power on at about 100 miles an hour and about 140 miles an hour at the bottom. The diameter of the loop is about 1000 feet, and very little altitude, if any, is lost on completion of the maneuver.

"After completing several loops in close succession I found that the rush of blood to the head causes an extremely warm feeling about the temples, and if one isn't in good condition he is apt to be a little bit 'woozy,' but this soon passes. Ordinarily upon landing the pilot will find that his eyes are slightly bloodshot, but no after effects are noticed unless too much speed was gained in the dive, and an attempt to change direction too fast was made. It is this changing direction snappily that throws the tremendously excessive strain on both pilot and ship."

During Lieut. Love's flight an ordinary safety belt was used, the only added precaution being a heavy rubber band to hold the clasp from opening accidentally.

New Flivver Type Plane on Market

RAY WILCOXSEN of Indiana has developed a new little ship for the lightplane market. It is a flivver type plane and he calls it "The Cloud-Boy." Officially it is named the Wilcoxsen M-1 Monoplane.

This little ship has a span of only 22 feet 3 inches; length, 14½ feet. It weighs approximately 280 pounds. Wilcoxsen has powered his ship with a rebuilt Henderson Motorcycle Motor, and has modeled the plane along the lines of an army pursuit ship. The motor rates 27 h. p. at 3000 r. p. m.

It carries a 165 lb. pilot, 7 gallons gas, and 5 quarts oil. It has a top speed of 76 m. p. h. and will give 40-45 miles to a gallon of gas.

Mr. Wilcoxsen has been issued a permit by the United States Government to fly his plane. If it proves successful, it will be marketed at a retail price of $960. Blue-prints of his ship are available to the amateur builder.

Ray Wilcoxsen is proudly exhibiting his "Cloud-Boy" which will sell for $960.

The Thrills of Killing Coyotes from the Air

A group of coyote hunters display six coyotes, the trophies of an exciting three-hour chase.

A NEW bird of prey made its appearance lately in the form of a mechanical bird. Dashing down deafeningly from the sky above, to meet its victim on the ground, it leaves behind the bloody remains of a coyote. Seldom, if ever, does it miss its mark as it dives and shoots forth spurts of flame from its circular nostril, like the dragon of old.

This coyote-killer-bird, of course, is an airplane. George W. Albrecht, 38, well-known farmer and sportsman living near Garrison, N. D., is its master. With his friend and gunner, William Fischer, 28, he has accounted for more than 100 coyotes in the two years that he has been chasing them from the plains and shooting them down as they yap and snarl beneath the under-carriage of this strange bird.

Their method of hunting coyotes is original, as they are the only men, so far as known, to hunt the little yellow wolves of the plains from an airplane. Flying at a fair altitude, Albrecht, at the pilot's controls, swings the plane in a circle over the territory in which coyotes are often sighted. Fischer, in the other cockpit, and armed with an automatic shotgun and shells loaded with BBshot, keeps a sharp lookout below. He sights a coyote, and signals Albrecht. The plane swings sharply nose downward.

Then, 150 feet from the ground, Albrecht levels the plane to an even keel. The coyote, on the ground beneath, snarls at the drone of the motor, and snaps at the shadow of the plane. The plane circles, and dives again, this time to within 50 feet of the now frightened but defiant coyote. Fischer's gun barks dimly on the roar of the motor. The coyote drops, kicking. The killing is over and the plane zooms swiftly upward, gaining altitude and the hunt is resumed.

Albrecht's use of an airplane to hunt coyotes is the outgrowth of his similar use of an automobile. For years he hunted the animals, firing at them from the rocking seat of an automobile as it sped over the plains near his home. Then that method of hunting lost its thrill.

In 1925 he took lessons in flying and became a licensed transport pilot. In 1927, he bought the airplane and in the fall of 1928 began his unique method of hunting animals. That the venture has proved profitable is of secondary importance to Albrecht. "I hunt from the plane for the sport of it," he said. "The first year that we hunted from the plane, we shot 50 coyotes and cleared about $900 from the sale of the pelts and the bounty paid by the state, but that is largely secondary. There is a thrill in hunting from a plane that cannot be equaled.

"There is nothing much to it. All you have to do is to fly low—about 150 feet—and then dive to about 50 feet when you see a coyote. The coyote, instead of trying to escape, usually snaps at the plane over his head and attempts to reach it by standing on his hind legs. Of course, that's the end of Mr. Coyote. Fischer doesn't miss many shots with the automatic."

Albrecht is a farmer by occupation and owns and operates a 640-acre farm at Roseglen, farming community near Garrison. Fischer, the gunner, is also a farmer, and like Albrecht, is an aviation enthusiast.

How to Build the Rhön Ranger

Part II. Assembling the Wing and Fuselage

In the August Issue, Part I of this article gave complete instructions for building the ribs. Copies of the August issue are available at 25c per copy. The third and last installment of this series will appear in the October issue and will give final instructions on assembling tail group, pilot's seat, controls, rigging and covering.

LAY the spars (H-1) on the bench and mark the positions of the rib; drill holes for the internal wire brace fittings (J-6). In drilling the holes for the threaded rods (J-23), great care must be exercised to get the holes exactly at right angles to the spar: a dowelling-jig or drill press should be used if available, drilling half-way through from each edge so that the rods will emerge from the spar at the correct points.

Next cut out the notches at the spar-tips for the spar extension members (H-3). Put these pieces on with glue and two small nails to hold them in place while you drill two 1/16" holes for the screws (J-22). Tighten the screws firmly. Next bolt on the fittings for the internal brace wires. These fittings (this does not include the flying and landing wire anchors which project through the fabric) must be in place before you put on the ribs, as the spar nailing strips have to be notched out on the ribs occurring where the fittings are located.

When the glue has dried, bend the spar extensions together as shown, glue, and fasten together with a 1-1/4" No. 6 screw. It is a good idea to strengthen this joint with a few turns of fine wire, 5/8" from the tip. When the last joint has dried, cut a notch in the end for the wing-tip member (H-5).

The spars are now ready for the ribs. Slip the ribs on, with the aileron ribs at the tip, put plenty of glue on both surfaces to be joined, and nail through the spar-nailing-strips into the spar, using a nail-set to drive the last 1/4". Use 3/4" No. 19 nails for this, three nails to each joint.

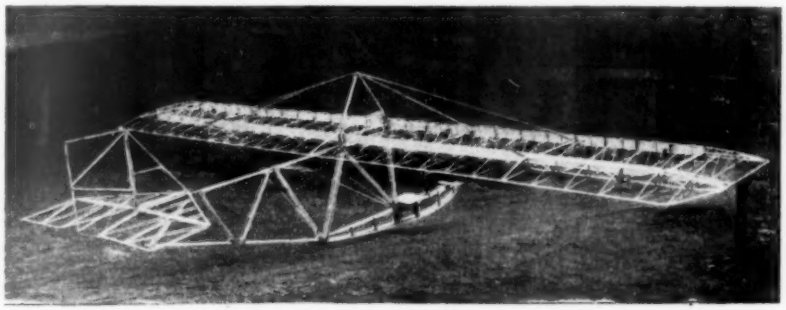
The center ribs have to have the extra capstrip (H-6) attached before nailing to the spars. Be sure to make one right hand and one left hand center rib. If you build one wing first, and then use it as a guide for the next wing, remember to make them opposite.

DON'T BUILD TWO RIGHT WINGS OR TWO LEFT WINGS!

Insert the leading and trailing edges, glue, and nail from the top through the bottom capstrip with 1" No. 20 nails (J-26), clinching the nails underneath.

When the leading edge is installed, make a pattern for the "nose-ribs" out of the 1/4" x 2" basswood (H-18). This pattern should fit squarely against the leading edge and the spar top, and finish flush with the noses of the ribs, so that the fabric will be smooth when stretched tightly over the wing. Cut out the other nose-ribs with a coping-saw, and nail them on with 1" No. 20 nails and glue.

When all the ribs, end pieces, etc. are in place, leading and trailing edges, etc., finished, put in the internal wing struts (H-7). These are to take the compressive thrust of the internal brace wires, and must fit tightly against the brace wire anchors. Nail the compression struts to the ribs wherever they come in contact, and put a small filler block between the two struts at the center.



The skeleton of the Rhon Ranger weighs only 105 pounds. Note its perfect balance as its stands unsupported.

When these are in place, put in the No. 14 wire bracing (J-12), sliding the ends through the ferrule (J-13), bending back past the ferrule and twisting around the wire again so that it can't come loose.

Before twisting the two wires together to tighten them, see that the wing is in perfect square (the spars must be at right angles to the ribs) and fasten it so that it will stay while you are working. A strip of wood nailed diagonally from the front spar to the rear spar makes a good brace.

Twisting the Internal Brace Wires

AS the wire is very hard and stiff, be careful, once you start, not to let the nail with which you twist it get away from you. It may fly out and hurt someone. The best way to do this part of the work is to bend a hook in the end of an eight-penny common nail, insert it between the wires up to the head, near enough to the center of the wires so that you can hook the nail under the other wires to hold it when you have finished twisting. Do not tighten the wires any more than necessary to make the wing rigid. When you have finished, check the wing again to see that it is all square, and if not, adjust it by tightening or loosening the wires a turn or two. When it is correct, tie the twisting-nails to the other wires so that they will not shake loose.

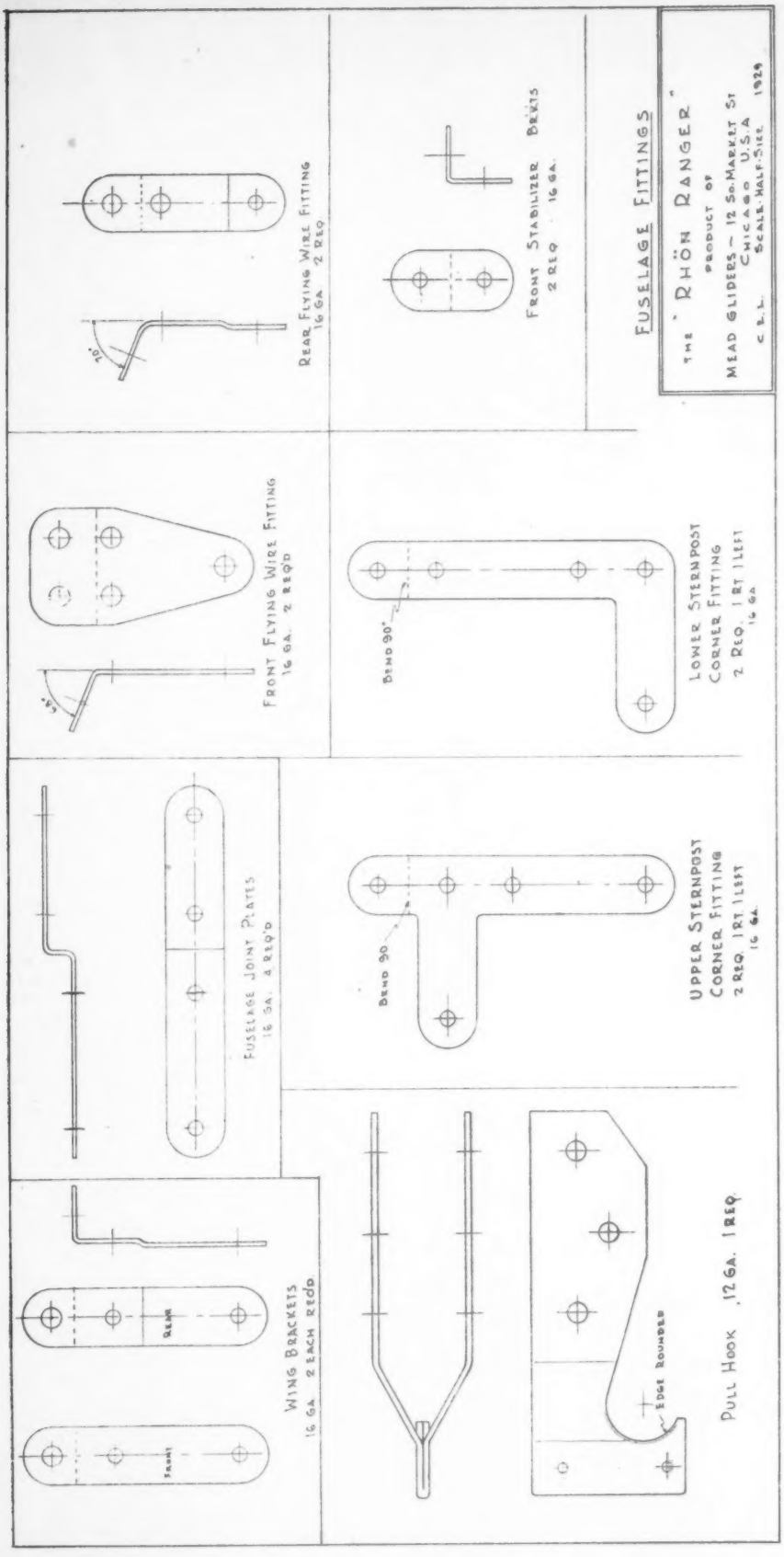
Next bolt the flying and landing wire strap anchors (J-1) to the spars, and tighten just enough to hold them in position. To determine the correct angle, cut a stick to the height of the cabane, set it on top of the spar-root, and stretch a string tight from the top of the stick to the center of the 1/4" bolt in the strap anchors. Line the anchors up with the string and mark the position on the spars. Follow the same procedure with the anchors on the opposite side, using a stick equal to the distance from the top of the fuselage to the flying wire anchors on the skid.

When this is done, put on the filler blocks which go between the wire anchors just adjusted. Make the blocks long enough so that you can taper the ends down to the spar and drive two or three 1" No. 20 nails in. They must be well glued, of course. It is advisable to make them high enough to reach the fabric line. The hole for the bolts which pass through these blocks may be drilled either in place, or the fittings may be taken off and drilled.

Ailerons

THE spars are made while the tails of the aileron ribs are still attached to the front portion. Mark the distance back of the rear main spar where the aileron spar is to go, on each aileron rib. Bevel the aileron spar strips (H-4) as shown, and glue and nail them inside the ribs, using a dead-stop and clinching the nails (J-26). When the glue has dried, nail the spar-struts (H-17) in place as shown. We advise you to complete the entire aileron before cutting it from the wing, though some may prefer to take it off as soon as the spar is finished.

Put on the trailing edges at the aileron gap (H-10) and attach the metal braces which reinforce the hinges (Use J-1). The strap hinges



should be prepared and the holes drilled before you cover the wing or aileron.

Put on all the diagonal brace struts (H-8) where shown. Attach the aileron-spring anchor fitting to the proper rib at the point indicated, and brace it with H-8 strips. Check over all items to see that you have not omitted anything.

Put on the angle bracket which anchors the rear-section brace wires (This fitting goes on the 1/4" bolt which holds the flying and landing wire anchors). Before covering anything, set up the glider by means of props and sawhorses, so that it is fairly true to its eventual completed rig-up, and make the various wires for rigging the ship.

The reason for this is to attach the rear-section brace wires to their fittings, and then fasten them to the trailing edge so they will pull in a straight line when the ship is covered and complete. As these wires run through the fabric, they must be attached to the spar permanently before you cover the wing. The top wire goes above the trailing edge and the bottom wire below. Tie the wires in neat coils near the trailing edge while you proceed with the work.

Before covering the wing, brace the ribs with the rib cord (K-3) running it from top to bottom to top, etc., winding it once around each capstrip at each point of contact. These cords should run in two parallel lines, where the rib-struts meet the capstrips (between the spars), and form a series of "X's" between each pair of ribs. This bracing holds the ribs vertical while you are covering the wing.

Building the Fuselage

THE following list of parts is needed for building and assembling the fuselage of the Rhon Ranger. The front section will be assembled first followed by the rear section:

Fuselage Front Section

Part No.	*Wood Material*
A1	1 spruce board 1-1/8"x 10"x8'-0" (skid)
A2	1 pc. hardwood 3/8"x3" x8'-0" (runner)
A3	10 ft. random lengths 5/8"x5/8" spruce (skid braces)
A4	2 pcs. spruce 5/8"x2-1/4" x8'-0" (main double struts)
A5	1 pc. spruce 1-1/8"x

2-1/4"x4'-3" (main single strut)

A6 1 pc. spruce 5/8"x1-1/8" x10" (double strut spacers)

A7 1 pc. spruce 1-1/8"x 1-1/2"x3'-0" (top horizontal strut & filler block)

Fuselage Rear Section Wood Material

B1 1 pc. spruce 1"x1-1/8"x 9 ft. (top longeron)

B2 1 pc. spruce 1"x1-1/8"x8 ft. (lower longeron)

B3 1 pc. spruce 1"x1-1/8" x5'-4" (filler blocks at strut stations, tail skid, and stern post)

B4 2 pcs. each, 1/4"x2" spruce 4'-0", 3'-0", 2'-9", 2'-8" (rear double struts)

B5 1 pc. spruce 5/8"x1"x10" (double strut spacer blocks)

Fuselage Hardware

C1 2 doz. 1" No. 8 FH wood screws (runner attachment)

C2 4 doz. 1-1/4" No. 6 FH wood screws (skid braces)

C3 3 doz. 1" finishing nails (strut spacer blocks)

C4 1 pc. sheet steel 1-1/2" x6" 16 gauge (front flying wire fittings)

C5 1 pc. strip steel 3/4"x 3 ft. 16 ga. (rear flying wire fittings, fuselage connecting plates, and wing angle brackets)

C6 1 pc. sheet steel 3"x12" 16 ga. (stern post corner plates)

C7 1 pc. sheet steel 2"x12" 12 gauge (nose hook)

C8 2 1/8" iron rivets (nose hook)

C9 18 3/16"x2-3/4" bolts (front section struts & fittings)

C10 32 3/16"x1-3/4" (bolts rear section struts & fittings, and brace wire turnbuckles)

C11 56 3/16" flat washers for same

C12 4 1/4"x2-3/4" bolts (flying wire fittings at skid)

C13 3 1/4"x2" bolts (nose hook)

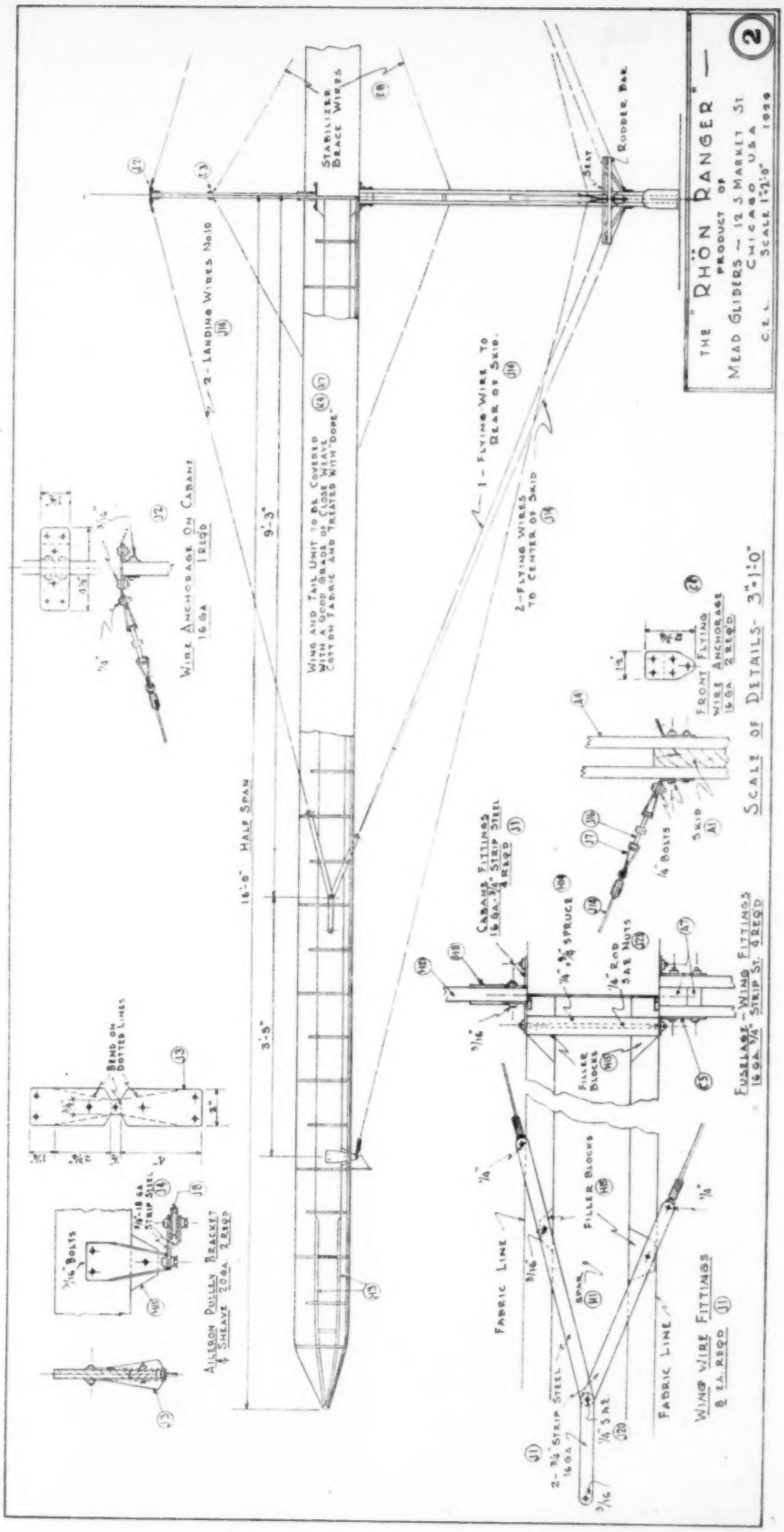
C14 1 pc. strip steel 5/8"x 2'-8" 18 ga. (turnbuckles)

C15 8 extra 3/16" nuts for turnbuckles)

C16 40 ft. No. 14 plated hard wire (rear section braces wires)

C17 4 No. 14 spiral wound ferrules for C16

(Continued on Page 62)


THE "RHÖN RANGER" — 2
PRODUCT OF
MEAD GLIDERS — 12 S. MARKET ST.
CHICAGO, U.S.A.
SCALE 1"=1'-0"
1930
STABILIZER BRACE WIRES
SEAT
RUBBER PAD
2 - LANDING WIRES No.10
WING AND TAIL UNIT TO BE COVERED WITH A GOOD GRADE OF CLOSE WEAVE COTTON FABRIC AND TREATED WITH "DOPE"
1 - FLYING WIRE TO REAR OF SKID
2 - FLYING WIRES TO CENTER OF SKID
WIRE ANCHORAGE ON CABANE 16 GA. 1 REQD
FRONT FLYING WIRE ANCHORAGES 16 GA. 2 REQD.
9'-3"
16'-6" HALF SPAN
3'-5"
CABANE FITTINGS 16 GA. 3/4" STRIP STEEL 4 REQD
SKID
1/4" BOLTS
1/4" SPRUCE
1/4" ROD SAE NUTS
FUSELAGE-WING FITTINGS 16 GA. 3/4" STRIP ST. 4 REQD
FILLER BLOCKS
SCALE OF DETAILS- 3"=1'-0"
BEND ON DOTTED LINES
3/16" BOLTS
AILERON PULLEY BRACKET 1/8" SHEAVE 2 REQD
FABRIC LINE
WING WIRE FITTINGS 8 EA. REQD
2-3/4" STRIP STEEL 16 GA.
SPAN

Rumpler Seaplane Will Surpass Dornier DO-X in Size

WHAT will be the largest seaplane in the world is now being designed in the plant of the Rumpler Motor Works of Berlin, Germany. Actual construction is expected to start not later than May, 1931.

The plane is to be used for transoceanic service exclusively. It will be able to carry a pay load of 42,000 pounds, and will transport 120 passengers and express baggage. The huge ship will have a wing spread of 289 feet, a length of 160 feet, and wing cord of 41 feet. As is the case with the Dornier plane, recently put into service in Germany, all passengers will be seated in the single wing of the plane, which will be 8 feet thick. The place ordinarily used for cabin space will be utilized for baggage and express.

Ten Diesel engines of the pusher type, each developing 500 horse-power, will be mounted on back of the wing. The Rumpler ship will have a cruising radius of 5,000 miles, and a gasoline capacity of 12,000 gallons, although by using crude oil for the Diesel engines, it is expected this will be reduced materially. The plane is being designed to have a maximum speed of 145 miles an hour with full load. Six mechanics, four pilots and a commanding officer are to make up the crew.

Safety Belt Designed for Primary Gliders

THE Russell Manufacturing Co. announces a new safety belt specially designed for use with primary gliders.

Features of the new belt are the positive lock fastener and the 8" wide waist band which gives support and protection to the pilot. Both ends are easily adjustable through a friction type buckle similar to the design used on parachute harnesses.

The belt is furnished with or without special elastic connecting links.

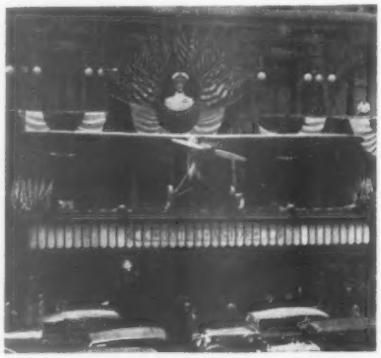
The manufacturers feel that the new belt is superior in every way to the imported belts formerly used. These foreign belts employed steel spring shock absorbers and were fabricated from a material furnishing less support to the pilot's body.

Graceful Monoplane Races 200 M. P. H.

A VIEW of the "Scout", designed by M. C. Tunison, showing its streamline construction, graceful wing and cabin lines and housed landing gear. It is a low-wing monoplane and has made 200 miles an hour. It is made of plywood, has a wing spread of 35 feet, ascended 1,000 feet the first minute of initial flight and made a smooth landing at 40 m. p. h. It has no struts. This craft is in the $2,500 class.

Fairchild Plane Displayed at Times Square

WHEN Rear Admiral Richard E. Byrd attended the functions in his honor at the Astor Hotel, a sister ship of his famous Fairchild "71" photoplane the "Stars and Stripes," will greeted him from the marquee on the Broadway entrance. The monoplane,



especially constructed for photographic work and equipped with skis, donated by George Hann, Pittsburgh aviation enthusiast, accompanied the Byrd Expedition, and from this plane more than 1500 remarkable photographs of the Antarctic region were taken.

Isn't this a beautiful job? The perfect streamlining not only allows for high speed but also gives a very graceful appearance.

Dead Men's Plane

By CAPT. JACK C. BURSEY, R.A.F.

ONE hears much these days about airplanes that are capable of being flown "hands off" of the controls, but it's nothing new. Probably the most outstanding example of "hands off" flying that ever occurred happened in France in 1917.

Here's what happened. An R. E. 8 observation plane (one of the world's worst planes—ask anyone who flew them over the lines!) was observing artillery fire for a British ground battery. Their target was about twenty miles on the enemy side of the lines, and the two men in the plane carried on with their monotonous job of spotting. When I say monotonous, I really mean it. It can get so bad that you'll forget about everything else — and that's apparently what happened to these two birds. Anyway, their eighty mile an hour plane was suddenly dived on by a one hundred and twenty mile an hour Fokker D. VII—with the usual results! Except that in this case, the pilot of the Fokker didn't follow up his burst—he just fired one burst and turned homeward. Little did he know what he had done!

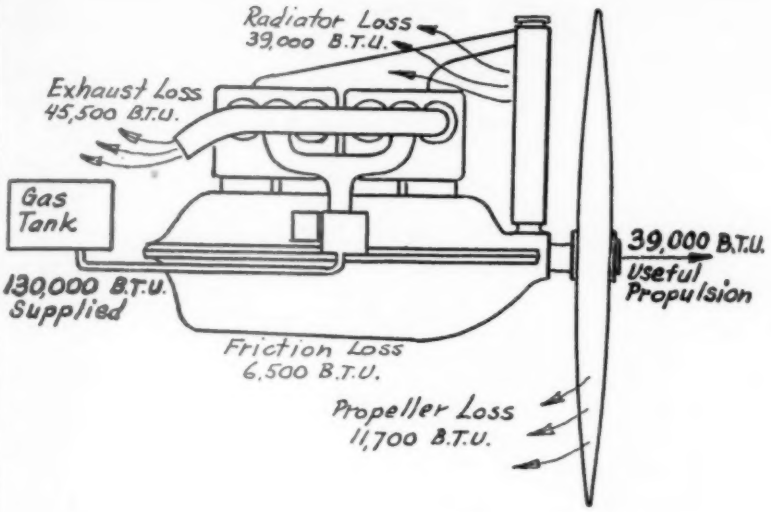
His spray of bullets hit the pilot and observer, killing them instantly, but did no damage to the plane. It so happened that they were headed in the direction of their own lines when Death overtook them, and that old R. E. 8 just kept on flying!

It flew back to friendly country, and kept on going! Dead man's hands at the controls—and the Grim Reaper riding in the back cockpit, too.

Back near Abbeville, where artillery observation planes are a rare sight, a group of soldiers were surprised to see the plane flying very low, and heading straight for them. Of course, they scampered out of the way, and as soon as the plane landed they rushed up to greet the aviators.

Imagine their surprise when they discovered the dead bodies of a pilot and an observer in the ship! Hastily calling their regimental medical officer, that worthy gasped in amazement when he saw the bodies. He reported that the pilot and observer had both been dead for more than an hour, and yet that plane had flown itself nearly one hundred miles. Not only that, but when the gasoline finally was exhausted, the plane landed itself as gently as if the most expert R. E. 8 pilot had been at the controls. I specify an "expert R. E. 8 pilot" because an R. E. 8 pilot was different from any other pilot during the war! My heart used to go out to them as they flew their flaming coffins through the heavens. How many planes of today will fly one hundred miles in a straight line and then land perfectly all by themselves? You can count 'em on the fingers of one hand—and have lots of room!

The 70% Fuel Loss!



The average airplane motor operates at 30% efficiency. What causes this waste? Where does all the power go?

IT is amazing to discover the amount of energy wasted in even the most advanced of the modern automobile and aviation engines. Out of five gallons of gasoline, about one gallon is applied usefully for the propulsion of the airplane at the best, while the other four gallons serve to heat the landscape. Heat radiation and friction take their toll of the energy contained in the gasoline to such an extent that future generations will look back on this generation with disdain as a generation of wasters and incompetents.

Heat engines of any type, the internal combustion engine, the steam engine or the hot-air engine, are notoriously inefficient for they convert only a small percentage of the fuel energy into useful mechanical energy. Starting with the combustion where the elements of the fuel combine with oxygen to produce heat, only a certain percentage of the fuel is actually burned because it is now impossible to get each molecule of the fuel in contact with the proper number of oxygen molecules to completely reduce the fuel molecule. Again, since the earth's atmosphere is not pure oxygen, but simply a mixture of about one-fourth oxygen gas with four-fifths of inert nitrogen gas, a great deal of energy is lost in heating up the useless nitrogen. This is one of the basic difficulties that lead to imperfect combustion, excessive combustion chambers and attending radiation.

Fuels are rated according to their heat content in British Thermal Units (B.T.U.) for the heat produced is the basis of the energy or power developed. In brief it may be said that the production of the B. T. U. per minute is equivalent to 0.0236 horsepower without taking the losses into consideration. Laboratory tests will show that the average aviation gasoline contains approximately 130,000 B. T. U. per gallon, or as will be shown by simple calculation, each gallon would be capable of producing 51 horsepower for one hour if burned without loss. In practice, however, we know that the power actually produced in an engine is far short of this figure, approximately 12 horsepower per gallon under the best conditions and generally still less with the engine adjustments in the usual condition.

THIS is best illustrated by the accompanying diagram that shows the approximate distribution of the various losses at full load under ideal conditions, the losses being given in terms of heat units. One gallon of gasoline in the gas tank supplies 130,000 B. T. U. which is frittered away at various points so that the total energy per gallon available for the propulsion of the ship is reduced to 39,000 B. T. U. as indicated by the arrow at the left. This is based on the assumption of an engine efficiency of 30 per cent.

When the exhaust valves lift, 45,500 B. T. U. out of the heat contained in the gallon of gasoline, escape into the great unknown. In addition to this tremendous loss, 39,000 B. T. U. are radiated by the cooling system as represented by the water jackets and radiator of a water-cooled engine or by the cooling fins of an air-cooled type. Either one of these losses is equal to or greater than the heat actually applied to the propulsion. It should be understood that the relation between the exhaust and jacket losses depends largely upon the carburetor adjustment, for in some cases the mixture may be regulated so that the jacket losses are greater than the exhaust losses. In most cases, however, the total loss through the exhaust and radiator is about constant at full load, that is, the sum is about constant for a given engine.

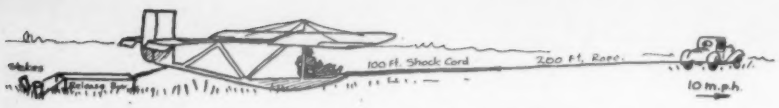
Friction losses in the bearings or in other rubbing surfaces are comparatively small, these amounting to 6,500 B. T. U. in this case or from 10 to 15 per cent in most engines. Deducting all of these losses gives the available power at the engine crankshaft, but to get the propulsive power we must deduct the losses taking place in the propeller, which in this case amounts to about 11,700 B. T. U. The propeller slips, churns the air uselessly and sets up eddies so that an average of 30 per cent of the energy disappears at this point. It is a sad condition but a true one, nevertheless.

Now let us say that the engine is throttled down. This reduces the compression pressure, and proportionately more heat passes to the jacket water so that the efficiency is reduced still further. If the carburetor is not properly adjusted, then there will be an increased loss due either to a greater percentage of unburned fuel or else to heating up an excess of air. Again, the combustion will be slower with a poor mixture and there will be increased losses through the jacket and exhaust. If the ignition system is not up to par, then unburned fuel will be rejected to the air by whole cylinders full every time that an explosion is missed. Under these conditions, it is likely that only 10,000 to 15,000 B. T. U. will be usefully applied to the propulsion instead of 39,000 B. T. U. per gallon of fuel.

If the engine is not well loaded to its rated output it will be wasteful of fuel for practically all of the losses increase relatively when the loading is decreased. Therefore, for the best results, the engine should be proportioned to the load so that the average load will lie on or near the most efficient load of the engine. This insures the greatest radius of action per tank of fuel.

Model Meet

A NATIONAL championship model airplane meet will be held August 23rd to September 1st at Curtiss-Wright-Reynolds Airport, Chicago, in conjunction with the 1930 National Air Races. Elimination contests will be organized in cities throughout the country.



New Device Launches Glider Without Crew

A NEW automatic launching assembly now enables one man instead of the customary 12 or more to launch a glider.

The launching device is simple: 100 feet of resilient multiple strand shock cord is tied to 200 feet of line, the cord end of which is attached to the nose of the glider and the rope end to the rear of an automobile. The tail of the glider is attached to a short rope which in turn connects by means of a special hook to the automatic releasing device. This device, a box only two feet long and four inches square, is securely staked to the ground.

Bolted inside the box is a steel cylinder in which sets a movable piston attached to two heavy elastic strands which lie between the cylinder and the sides of the box. The cover, sliding in a groove, is set for any desired pressure and determines the time at which the glider is released.

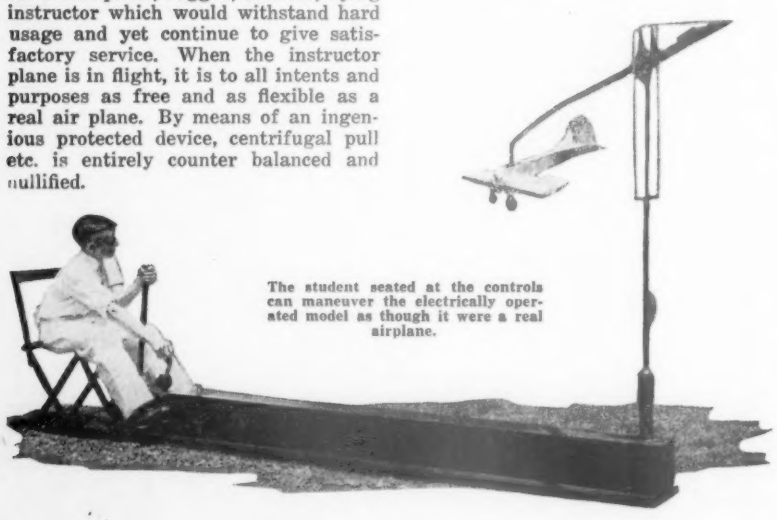
The car is put in motion at a steady speed of ten miles an hour in the same direction in which the glider is to fly, thus stretching the shock cord assembly and slowly pulling the piston in the releasing box. The special hook attaching the tail of the glider to the piston slips by the edge of the cover and automatically releases. Due to the great length of the shock cord and the approximate six inch momentum gained before release, the glider is not catapulted but launched gradually, with increasing speed, into the air. Once in the air, when the shock cord has contracted, the ring holding it in the downward curved hook on the nose of the glider, drops off. The vacuum resistance of the cylinder in the releasing box prevents the piston from recoiling into its socket.

Electric Machine Gives Flight Instruction

THE Pardue Flying Instructor is just an electric machine, but it will teach you to fly. The model flyer can safely advance another step and actually learn the feel of the joy stick and the foot pedals without leaving the ground.

With this device pupils can learn of the operation of elevators, ailerons, rudders, etc. They will know accurately what must be done to cause the ship to take off, to rise, to descend, to bank, to make right and left turns, to zoom, etc. They can cause a plane to go into a tail spin, to slip, to stall, etc. Parks Air College uses this machine for training purposes.

In developing the Pardue Flying Instructor the inventors, John L. and T. M. Pardue had in mind the necessity for a fool proof, rugged, efficient, flying instructor which would withstand hard usage and yet continue to give satisfactory service. When the instructor plane is in flight, it is to all intents and purposes as free and as flexible as a real air plane. By means of an ingenious protected device, centrifugal pull etc. is entirely counter balanced and nullified.



The student seated at the controls can maneuver the electrically operated model as though it were a real airplane.

Rocket Plane Can Glide from Newfoundland to New York

DR. PAUL HEYLANDT, one of Germany's leading authorities on the application of liquid gases for industrial purposes, predicts that the time is not far off when airplanes can be shot thousands of feet into the sky by means of a new type rocket motor and can reach the United States from Europe in from six to eight hours. More than that, Dr. Heylandt says, so high will be the speed—between 300 and 600 miles an hour—of this rocket-propelled plane, that the power can be turned off over Newfoundland and the pilot can glide the rest of the way to New York.

Parachutes Must Pass Five Tests for License

FIVE tests, involving more than a score of drops from an airplane in flight, will now be required of each parachute type submitted to the Department of Commerce for approval.

In the first test, promptness of opening must be proved by the parachute opening fully within three seconds after being dropped with a dummy weighing 170 pounds from a plane flying 70 miles an hour and at an altitude of 500 feet. Twelve such drops will be made.

The second test will be conducted under the same conditions with the exception that the suspension lines will be twisted and the parachute must open fully within four and one-half seconds with all twists removed. Five such drops shall be made.

The third test to determine the strength of the parachute will involve three drops with a 600 pound weight from a plane flying 100 miles an hour, and at an altitude of not more than 500 feet.

Two live drops, to be made with a 170 pound man from an altitude of 2,000 feet, will constitute the fourth test.

The last test, to determine the rate of descent which shall not exceed 21 feet per second, will be accomplished by dropping a parachute from an altitude of 2,500 feet with a 170 pound dummy.

The new regulations require that parachutes approved by the Department of Commerce shall be packed or repacked at least once in each 60 days before being worn in flights.

West Coast Engineer Produces Power Glider

AN ENGINEER on the West Coast has produced an airplane that is practically a glider of the "flying wing" type which he plans to market for around $1,000. It is powered with a small, light low-priced engine of extreme simplicity. This power glider takes off in 35 feet at a speed of 25 miles per hour, cruises at 45 miles per hour on less than two gallons of gas per hour. The landing speed is 15 miles per hour flying in and, when the power glider is mushed in at stall flight, it has repeatedly been landed in a ten-foot space at a speed of not more than five miles per hour.

This power glider is practically spin proof and stall proof. It also takes off and lands at approximately flying position so that the necessity of raising the tail and balancing the craft on take-off is, to a great extent, eliminated. Also, on landing, the ship is flown in with the controls in practically the same position as in level flight, it only being necessary to "cut the gun" and let the ship settle into the field.

Taken for a Ride in a Jenny

An actual experience—By ROBERT GRAY

A commercial pilot is invited for a ride in an old Jenny. He enjoyed the ride—until the plane began to fall apart!

BACK in the Spring of 1926, while between jobs as an aerial photographer and commercial pilot, a friend of mine called me on long distance.

"Hello, Bob," said the friend. "I've got great news." I was to learn before long that that great news of his was to develop into near disastrous news—for me. He continued, enthusiastically, "I've just bought a plane from the Government."

I was duly impressed, and congratulated him.

"Would you mind running over and giving the ship a test flight?" he asked.

"No!" I cheerfully replied, "I'd be glad to."

I anticipated a little joy hop, for I didn't have a ship of my own at the moment. Flying was in my blood, and I didn't get any kick out of being "grounded" for lack of a plane.

I jumped into my car and motored over to Clover Field. He joined me and proudly led me over to the old Jenny. Need I say more than that it was a Jenny?

He was fairly bursting with pride of ownership. He had spread on gallons of paint. The Government requires that all purchasers of Army planes must paint out the Army insignia on the wings. However, judging from the paint job, I suspected that the government ruling had only been an excuse to "doll" it up, as only a "ground" flyer loves to do. However, I had to admit it made a pretty picture in the California sunshine.

Nevertheless, paint is just paint. I may be misled by a "dolled-up" second-hand car, but all the paint in the world won't keep a crate up in the air if it feels a sudden affinity for terra-firma. Having crashed a time or two I know.

I prowled around the JN4D, ignoring his artistic efforts, but letting nothing else escape my critical eye. I believe that the best time to prevent a ship from cracking up is before it leaves the ground.

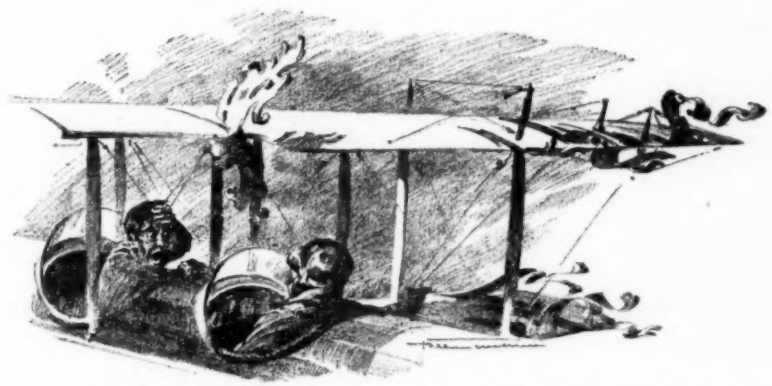
I checked up the rigging and examined my aileron control wires; jerked my flippers back and forth and went over the ship in general. Then I called the mechanic to spin the prop.

"Choke on—switch off," I yelled to the mechanic. He spun the prop several times until I had a little gas in the cylinders.

"Contact," he cried.

"Switch on," I answered.

The mechanic spun the prop. The old OX5 burst into a merry roar. I was surprised at how sweet the engine sounded. It was evident that the Army mechanics knew their engine.



"My companion gripped the cowling. I could see him bracing himself for the inevitable fall. His grin was gone and in its place was a most sickly looking vacant stare."

MEANTIME, with his mouth wide open, my friend was "revv-ing" up his lungs to tell the gathering throng all of the fine points of his *fast* racer.

"Coming along?" I asked him.

Like the well-known peacock, he strutted up to the plane and climbed into the front cock-pit like an old-timer, although I knew he had been up only a few times, and then only with me.

I gunned the motor a bit and found that it had warmed nicely. With a wave of my hand I started down the runway on what was destined to be literally high adventure.

The ship handled surprisingly well for a Jenny. Pulling back on the stick I climbed for altitude. I did a few banks and then a wing over.

My friend turned around shaking both of his hands in the air, signifying that he was congratulating himself on his buy. He gave me a motion with his hand to do a loop. As I had taken him up before and stunted he wasn't entirely a novice. So I nosed the ship down a bit, gave her the gun and went into a beautiful loop. That wasn't bad, so I tried a few more.

In coming out of one of these loops I noticed some newspaper flying past. I wondered where that could have come from, as we were then at about three thousand feet altitude and there hadn't been any high wind on leaving the ground. However, I gave the trivial matter not so much as a second thought.

In the distance we saw another ship. We started off towards it. We saw that a chap was clinging precariously to a wing, getting ready to make an exhibition parachute drop.

Looking down, I found that we were directly over the air port. In my younger days I had always played to the grand-stand whenever occasion permitted, and I saw in the parachute drop another such chance. Realizing that people were probably watching the exhibition jumper, I thought we might put on an exhibition of our own that would be *an exhibition.* It was!!!

I STARTED in to give the old crate the works, doing a number of the stunts, such as we did at the front during the war. The old Jenny responded nobly, even though she was nothing but an antiquated training ship.

Loops are particularly hard to do in a Jenny and I was congratulating myself on the way the ship was handling. My friend, too, was beaming from ear to ear.

We sure did stuff that a Jenny wasn't supposed to do. I guess the parachute jumper was a little afraid to jump while we were doing our aerobatics for I had noticed him repeatedly wave us away. I relented and flew out of the picture, giving him a chance to finish his act.

Going into a fast bank I again noticed newspapers flipping by. Those papers were beginning to mystify me, and I was about ready to say: "Quick, Watson. The needle!"

Meantime, the parachute jumper had to let go and his chute had opened gracefully letting him float gently towards the ground.

I gave the old Jenny the gun and stuck her nose to the ground. I leveled off rather abruptly. Again newspapers flew at me! This time a piece of one hit my helmet and the wind pressure held it there. I reached up and pulled it down.

IMAGINE my embarrassment when I found that these supposedly extra

editions were in reality fabric off some ship. I hardly dared look at my wings for fear I would learn what I suspected: that it was the old Jenny's fabric. Ergo, I would be the inspiration for scare headlines.

My friend, blissfully ignorant of our desperate predicament, was still grinning, as he watched the parachute jumper slowly settling to the ground.

My eyes glanced at our wings. Sure enough, big patches had come loose and the wind was threatening to strip the Jenny as bare as we were in the old Army days when up for physical inspection.

I eased up on the throttle. Gently I nosed her toward the ground, handling her as carefully as I would if she were loaded with high explosives.

My friend, noticing the slowing up, turned to look at me. He pointed down toward the parachute jumper, then pointed to himself and vigorously shook his head, as though to tell me that he wouldn't be foolish enough to do such a stunt.

I hardly had the heart to break the news to him. But I did. Somehow I pointed to our wings. He saw! He comprehended!

I IMAGINE about that moment he wished he could just have a chance to make a parachute jump. But there was to be no such good luck for either of us. We didn't have a 'chute between us. It was in the cards that no matter how that crate landed, we'd land with it, whether or no.

My companion slumped into the seat and gripped the cowling. I could see him bracing himself for the inevitable fall he felt was coming, as though bracing would do any good. It was purely an involuntary gesture on his part. His grin was gone, magically. In its place was a most sickly looking, vacant stare.

I don't imagine I was a healthy looking specimen, myself. It's a cinch I wouldn't have been called a good insurance risk!

All of this I took in subconsciously. All of my conscious thoughts were concentrated on nursing the ship to the ground. I banked a little more to save the right wing, which by this time was fast ripping, and coming loose.

We circled the field once more and by this time had lost a great deal of altitude. We certainly were giving those spectators down there an exhibition that wasn't on the program and which wasn't a part of our scheduled routine.

Telephone wires hove upon my vision. The ground was so near and yet so far. If I only made proper allowance for that "game" wing we'd make a decent landing yet. But if we tangled with the wires: well, we'd at least die with our helmets on.

Somehow we slid over those wires with a scant yard to spare and made as good a landing as could be expected.

WE CRAWLED out of the cock-pit, not a little shakily, I must admit. My friend got out first, nearly breaking his neck in a two-foot drop. I guess he wasn't convinced yet that we were down without crashing. I trailed out after him and grabbed him roughly by the arm.

"How'd you say you painted this crate," I yelled at him, as my eyes took in the wings.

"Well," he chattered, "first had to clean off the Army insignia—"

"Yes, yes," I said impatiently. "But what kind of paint did you use."

"Oh, just some good automobile paint that I had left over from painting my car."

By this time I had circled the ship, dragging him along with me. I came to where the insignia had been and inspected what was left of the fabric more closely. I found that was where the ripping had started.

A furrow creased my brow, as I barked at him: "What did you say you used on the insignia before you painted it?"

"I didn't say," he wise-cracked, as he began feeling less frightened.

"Well you better say," I answered.

"It's sort of a smart idea of mine," he admitted. "You see I didn't want to use several coats of paint and wait for them to dry, so I just used some ordinary varnish remover."

"Varnish remover," I snarled, as only a man can who has barely escaped having his face pushed under the sod by an engine crushing him. "Varnish remover," I echoed. "You—you ap-say!" I stuttered. "That varnish remover removed the fabric along with the insignia. You—you—say, that varnish remover damn near removed us."

"No!" he denied, hollowly.

"YES!"

Queer Pendulum Plane Claims Stability

A MONOPLANE of novel design, declared by its inventor, R. V. Norris of San Francisco, Calif., to be "foolproof," is undergoing tests at the Redwood City, Calif., airport. The radial motor is attached to the wing, from which is suspended the fuselage which remains on an even keel during the flight. The wing may be tilted in any direction at the will of the pilot, by means of control wires from his seat in the cockpit.

Sculptor Designs Special Medal for Byrd

JULIO KILENYI, New York sculptor, is shown putting the finishing touches on the medal presented to Rear Admiral Richard E. Byrd and members of his expedition upon their return to New York. The design was selected in competition with work submitted by several of America's leading sculptors. The medals were presented at the Aeronautical Chamber of Commerce Dinner to Admiral Byrd June 25th in the Hotel Astor.

Exhibition Jumper Must Now Wear Two Parachutes

INDIVIDUALS making parachute jumps for purposes of exhibition, testing, training or demonstration will be required to wear an auxiliary parachute, under a new amendment to the Air Commerce Regulations. The amendment becomes effective August 1, 1930.

The auxiliary parachute must be so arranged that it can be operated in the event the first parachute either fails to function or becomes fouled on any part of the plane or body of the jumper. While it is common practice for parachute jumpers to carry an auxiliary parachute, there have been times in the past when this has been neglected.

How Planes Are Lowered Below Deck

THIS extraordinary picture shows how planes are lowered into the hold of an airplane carrier.

As soon as a plane lands on deck it must clear the way for other planes to follow. It is taxied to a huge elevator and is then lowered into its under-deck hangar.

In this picture a speedy pursuit plane is being tucked away in the U. S. S. Saratoga. Over 100 planes can be carried conveniently in this sea-going landing field.

Should Gliders Be Towed By Airplanes?

AMONG experienced glider pilots there is some difference of opinion as to whether or not gliders should be towed by airplanes. The majority seem to say NO. If they are to be towed, however, it is certain that they should be constructed especially for that purpose, properly stressed for the work, and with controls designed to function at airplane speeds.

The Department of Commerce rules that special permission is necessary for airplane towing, so we may conclude that the Department considers the practice permissible when all their requirements are met. However, the practice may easily result in a very unfortunate feature that neither the Department of Commerce nor the aviation industry can control.

Boys and younger pilots, noticing the publicity features of this practice, easily may persuade themselves that airplane-towing of any sort of glider is safe enough, and allow themselves to be towed, without troubling to secure permission. If their glider is not constructed for that work, the results may be disastrous.

It should be noted that the controls of a glider are designed to function at speeds of from 15 to 20 miles per hour. When the glider is towed behind an airplane at 70 or 80 miles per hour the controls become so sensitive and effective that the pilot invariably over-controls. Despite himself, he may so handle the controls that he turns his glider into a catapult, and shoots himself out of his safety-belt and into the air, as already has happened. The glider was designed, not as a catapult, but as a vehicle to soar through the air.

New Power Glider to Sell for $650

THE first of the gliders of the "Dragonfly" design will be ready for flight tests within a month according to Alfred Schwarz, President of the Wing Aeronautical Corporation, who is the inventor of the motor to be used in the "Dragonfly."

The motor is constructed in the three blade propeller and is expected to develop 35 horsepower. The ship is a true glider in the sense that it will sustain flight in favorable wind currents, but has the features of a light airplane as it takes off under its own power, and has cruising speed of 70 miles per hour.

Capt. Frederick Pippig, the noted German glider expert, is chief engineer in charge of construction. He is a war ace of the Richtofen Circus. He has come to America to live and has taken out his citizenship papers.

The "Dragonfly" is designed for sport use and short point-to-point flight. It will sell at $650.00.

Truck Delivers Hot Oil

THE Standard Oil Co. of Ohio uses this General Motors Truck and semi-trailer with 500-gallon gasoline tank for airport service in Cleveland. The semi-trailer also carries two 60-gallon oil tanks, and hose reels, air tanks, water tanks, in short, everything needed for complete servicing. A 12' air compressor driven by power take-off from the transmission hoists gasoline, oil and water 20 feet. The oil reservoirs are jacketed and electrically heated. The oil can be dispensed at all times at crankcase temperature.

Trimotor Fokker Eats a Gallon of Gas Per Minute

IT takes 60 gallons of gasoline an hour to run it—a gallon every minute! What kind of automobile is that? It isn't. It's an airplane—one of the trimotored Fokkers of West Coast Air Transport, Flying between Portland, Seattle and Oakland.

Figures compiled by Captain L. G. Devaney, superintendent of operations for the air line, show that one of the West Coast tri-motors uses a ton and a quarter of gasoline between Seattle and Oakland. During this trip, the plane is in the air six hours and 15 minutes. While one gallon of gas is being consumed, the propellers turn over 1650 times at cruising speed of 120 miles an hour. With all this gas consumption, the Fokker plane is among the most economical of the larger transport ships.

Some Interesting Details of a Military Training Plane

THE Curtiss XBT-4, as the plane will be known, is the first of a new series of distinctly military planes for advanced training of attack, light bombing and observation pilots. It was produced at the Curtiss-Wright experimental plant in Garden City in exactly fourteen days and has surpassed the Government requirements in factory flight tests.

Since pilot's vision is one of the most vital necessities in a training plane, T. P. Wright, chief engineer for Curtiss, has concentrated upon this feature in the new plane. The rear cockpit, in which the instructor sits, has been raised higher than in former models. The cowling, instead of being rounded, is squared and sloped to give equally good vision whether forward or to the right and left. The cowling also slopes, from both cockpits, at an angle six degrees below the wings, which are well staggered. The windshields have small frontal area and wings which keep drafts off the pilots. They are arranged to permit easy egress in emergencies.

Another entirely new feature in the Curtiss XBT-4 is a large mirror mounted in the upper wing over the student cockpit. This will give the instructor an opportunity to watch the student pilot at all times and observe his technique.

As an innovation in safety, a new method of mounting a full thickness sponge rubber pad over the instrument board has been adopted. This has opening cut through to expose the dials. The navigation instruments are grouped in the center and are lighted indirectly. The electrical instruments are on the left and the engine instruments on the right.

Comfort for the pilots has been stressed in the Curtiss XBT-4 as never before in a military plane. The seats, which may be raised or lowered seven and one-half inches, are tilted back at an angle of thirteen degrees from level.

Extreme neatness of the cockpit interiors is enhanced by the fact that all mechanism is hidden behind the wooden veneer walls. The mechanism is still easy to reach for work or inspection through large laced panels.

For the first time, in military planes, the wabble pump is arranged above the throttle. This makes it easy to reach and operate as well as preventing difficulty in the arrangement of the stabilizer control of which only the handle protrudes into the cockpit. All controls except the flying controls and the radiator shutter are operated with the left hand, leaving the right free at all times for the stick.

Wind Indicator Visible at Seven Miles

ANOTHER important aid to pilots landing either in daytime or night has just been invented by S. H. Young, former engineering instructor at St. Thomas college of St. Paul. The device is a wind indicator visible from a distance of seven miles at night. At all times the indicator will tell the pilot the velocity of the wind up to 30 miles an hour.

The new indicator is of rigid airplane-body construction. It is 18 feet long, three feet in diameter and is lighted at night by a single 100-watt light. Many large airports have already installed this new device.

New Lightplane Will Travel 100 M. P. H.

JACK RUSSELL of Oklahoma has sent us a description of his Russell Comet. It is a high-wing monoplane, designed for the novice.

It is very stable and will fly "hands off" indefinitely. It is comparatively light for its size, weighing 407 empty, has a wing spread of 24 ft., chord 5 ft., length from tip of rudder to tip of propeller 21 ft.

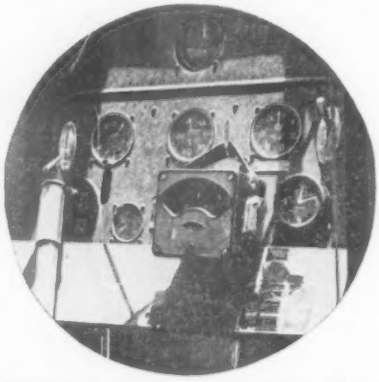
All fuselage members are of welded steel tubing including the tail group, making a very sturdy job for a small plane. The wing is of spruce and has a special wing curve. It will get off very quickly and climb fast at a rate of 700 ft. per min. with 35 H. P. motor. It has a high speed of over 100 miles per hour, yet will land at 24 to 26 miles per hour.

The pilot may land it hard or pancake it, it will not bounce back into the air, and will come to a sudden stop. Usually 100 ft. is all the space required to make a landing. The ship was recently tried for a speed test over a distance of 78 miles which it made in 38 minutes, using one gallon and three quarts of gas and less than a pint of oil. It carries 12 gallons of gas and 2 gallons of oil and has a cruising radius of four and a half hours. It will average 30 miles to the gallon of gas.

The price of the Russell Comet is $1750 with 35 h. p. motor. Ship less motor $1000.

Unique Radio Device Guides Plane Direct to Broadcasting Station

A RADIO device that is expected to mean the end of the tragic story of blind flying in foggy and stormy weather has been given successful tests in Southern California. With this new navigation device invented by A. J. Shoemaker, Long Beach, California, a pilot with an ordinary knowledge of



This device operates on the sound wave of any broadcasting station. When the plane swerves from its bee-line, this indicator moves accordingly. It is attached here to the instrument board of a Curtiss Robin.

radio telegraphy may point his airplane unerringly toward any broadcasting station that the tiny receiving set on board picks up.

Flying at night or in fog, the pilot merely sets his dials to receive some station broadcasting an ordinary musical or lecture program. When the plane leaves the radius emanating from that station, the indicator swings either right or left, as the case may be, enabling the aviator to correct his course toward the radio station.

The apparatus is extremely simple. A portable type radio receiver is installed in the ship. Instead of wiring the output circuit into a loud speaker, it is connected with an indicator somewhat resembling an ammeter. This indicating meter with its white pointed needle may be installed any place in the ship. The inventor suggests that it be placed on the control board.

J. Lloyd O'Donnell, well-known Southern California pilot, has tested the device several times.

"On the first test," says Mr. O'Donnell, "we took off from Long Beach in a Ryan Brougham after tuning in our receiving set to station KFI in Los Angeles. Following the dial indicator we flew directly over the antennae of that radio station. It guides accurately to a fraction of a degree."

An entirely new feature is the fact that the device operates automatically upon the sound of the broadcasting band. At present other radio direction devices use apparatus of some character adapted to function upon the beacon principle or the carrier wave emitted from a broadcasting station. With the Shoemaker invention a pilot needs only to know the wave length or kilocycle of a certain broadcasting station. He sets his dials for that station and the music or sound from that station affects the direction finding device which guides the plane unerringly to the broadcasting station.

Another startling feature from the standpoint of the aviation engineer, is the fact that no shielding on an airplane is required, that is the keeping out of interference from the ignition system of the motor. The antennae is hidden in the fuselage.

Aviation authorities to whom Mr. Shoemaker has shown his device see great possibilities in the installation of broadcasting stations at flying fields, so that a plane could tune in on the field station and be guided directly to the airport without the necessity of resorting to commercial broadcasting to furnish the directional key.

The device has also successfully indicated wind drafts. By means of this direction finding apparatus an airplane or a ship at sea might tune in on an S. O. S. being sent out by an aviator or a ship's radio and go directly toward that sound wave.

The complete apparatus for which patents are pending will probably sell for under $500.

Shoemaker, who is 31 years old, owned a sending and receiving station when he was nine years old. He began work on this radio device eight months ago.

Older Men Want to Fly

ALMOST half of the inquiries for Sport Training Planes received by Great Lakes Aircraft Corporation, come from persons between 30 and 35 years of age, despite the widely-held belief that flying is only for the young. As a matter of fact, according to a survey just completed by the Great Lakes company, inquiries from those between 25 and 30 years of age were only twice as numerous as those from persons between 45 and 50 years old.

Jack Russell is standing beside his "Comet". It sells in the lightplane division, will land at 24 m. p. h. and fly at 100 m. p. h.

Jack Barstow Enters Race from Hospital

IT takes nerve to enter an airplane race—particularly from a sick bed. Jack Barstow, famous West Coast glider and airplane pilot, sent the following wire to the sponsors of the All-America Flying Derby:

"HAVE PURCHASED GREAT LAKES SPORT-TRAINER FOR RACE STOP IN HOSPITAL FROM GLIDER ACCIDENT STOP IF I SEND ENTRY FEE NOW WOULD YOU REFUND IF STILL IN HOSPITAL AND NOTIFY YOU BY JULY TENTH STOP PLEASE WIRE MERCY HOSPITAL SAN DIEGO CALIF SINCERELY JACK BARSTOW!"

Needless to say, the race officials accepted Barstow's proposal, and the popular pilot will carry No. 2 in the race. It is hoped that he will get well in time to take part in the race and that he has better luck in his Great Lakes than he did in the glider.

New Warner Lightplane Engine

WARNER Aircraft's new 5-cylinder airplane engine has just completed its department of commerce tests and has been awarded its approved type certificate with a 90 h. p. rating.

The engine was built especially for use in light airplanes, supplementing the 7-cylinder job which has been used in sport planes, training ships and other medium size crafts.

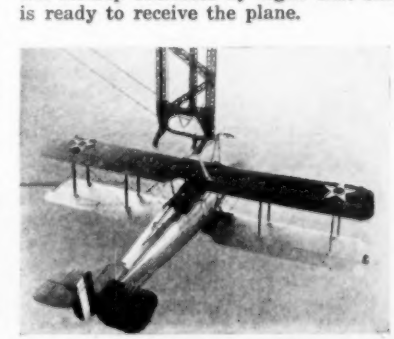
Plane Hooks on Dirigible at High Speed

RECENTLY a plane was launched from a carrier, hooked on to the LOS ANGELES, thence returned to the carrier. By such means it is possible to transfer supplies, including fuel, personnel, medical attention, etc., between an airship in flight and the ground or sea. This is certain to enhance the great value of airship travel.

The equipment now in use on the LOS ANGELES consists briefly of a rigid lattice work structure extending about 15 feet below the keel of the airship and carrying on its lower end a rigid cross bar provided with shock absorbers. The plane carries above its wings a supporting structure on which is mounted an automatic locking device which engages the cross bar. By flying at a speed slightly in excess of that of the airship the pilot shoots the mark and is then carried on the cross bar. The whole structure is then rotated to bring the plane close under the airship for transfer of passengers or supplies.

In releasing, the pilot trips the automatic device on the plane and drops off in a dive until flying speed is attained. The gear in use with the LOS ANGELES is subject to several improvements and these undoubtedly will be made as further work with this apparatus is continued. The Navy is endeavoring to perfect the system for both commercial use and particularly for its application, later to military airships.

The method of approach for the actual hookon is comparable to that used in landing on the carriers. The plane lines up astern and somewhat below the airship and makes passes until the airship indicates by signs that she is ready to receive the plane.



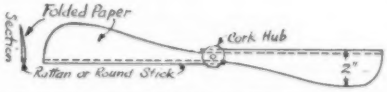
Closeup of plane hooked on Los Angles showing the necessary equipment on both plane and dirigible

How to Build a Model Helicopter

HELICOPTERS are back in style again. Even the Curtiss-Wright outfit is experimenting with its Bleecker Helicopter. As a helicopter flies very nicely in model form—much better than most full size machines—it will be interesting to try our hand at the job.

The helicopter, as you probably know in advance, is a machine that flies straight up into the air without running along the ground, and is pulled up by a horizontal propeller without the aid of wings. Some of these models, when carefully built, will climb straight up for two hundred feet or more and then descend nearly to the point where they started, always providing of course, that they are not carried away by the wind.

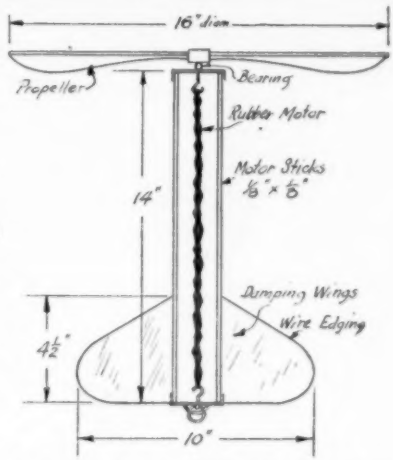
As with the airplane models, the power plant of this helicopter will be the usual rubber motor carried between two motor sticks, driving a large diameter propeller at the end of the sticks. This layout is shown clearly by the accompanying figure where the propeller diameter is indicated as sixteen inches. As a matter of fact, this is like building an airplane without wings except for the "damping wings" placed at the bottom of the motor to prevent its rotation.



The usual carved wood propeller is much too heavy. Here is a sketch of a propeller showing the cork hub and construction of blades.

The rubber tends to drive the propeller in one direction while the reaction tends to rotate the motor in the opposite direction, hence the damping wings must be attached to the stick so that the motor will rotate very slowly. The larger the damping surfaces, the slower will be the motor rotation and the higher the helicopter will fly. In general, the area of the dampers shown is sufficient for a beginning and will give satisfactory service.

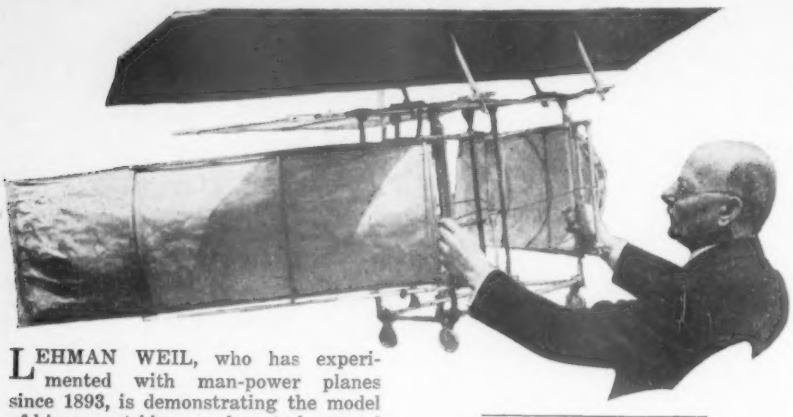
Now, a helicopter propeller or lifting screw must be large in diameter and must rotate at a comparatively low speed when compared with the propellers used with model airplanes. For this reason a special paper propeller is used so as to get a large screw without unnecessary weight. The usual carved wood propeller is much too heavy for this work unless it is carved down to paper thinness. A separate diagram is given for the construction of the propeller for this is the main part of the helicopter and must be carefully attended to.



A plan view of the model Helicopter. It is built like an airplane without wings except for the "damping wings" at the bottom to prevent rotation.

A plan view of the propeller shows that a cork is used for the hub, and that two sticks inserted into this hub form the beams of the blades. These are round sticks, about 1/8 inch in diameter, and by turning them in the hub we can easily adjust the pitch of the blades. This propeller is a double surfaced affair, a piece of rather stiff paper being folded around the stick as shown by the sectional view. A good many trials may be required before the proper pitch or blade angle is found, but this is a comparatively simple adjustment after you have played with it for a while.

Inventor Plans to Row His Way Through Air



LEHMAN WEIL, who has experimented with man-power planes since 1893, is demonstrating the model of his newest idea—a plane to be rowed through the air. Mr. Weil is shown with his hand on one of the handles of the "oars," which will be pushed instead of pulled. The plane has no rudder, but has an elevator. It will be steered just as one steers a row boat—by resting one oar and manipulating the other. The test of the model was successful and the inventor will start construction on a large plane.

Girl Flyer Pitched from Looping Plane

THEY'LL have to begin making pilots' seats smaller and controls easier to reach if women and lightweight men are to fly modern airplanes, according to Mildred Kauffman, famous girl aviator.

At the aviation show recently held in Buffalo, N. Y., Miss Kauffman decided to attempt to break her own consecutive loop record, which was 46. She believed she would be able to make 125 without much trouble.

But the pilot's seat in the American Eagle biplane which she was flying was too large for her, so it was necessary to put cushions in it in order that she might reach the controls handily. This meant that the safety strap was too short to reach over her lap. So a couple of stays were fastened in the back of the seat, and the strap stretched across her chest.

The experts at the airport figured this settled that problem. Miss Kauffman took off before a crowd of several thousand and at 7,000 feet began her loops. She had made 36 when the ship stalled at the top of a loop. One of the stays holding her safety strap broke, and she was pitched out!

Miss Kauffman pulled her parachute ring and, fortunately, landed safely, her only injury being a cut chin received when the parachute dragged her after landing. The plane was a total wreck.

"The next time I try for a loop record, it'll be in a ship with a smaller seat so that the safety strap can be fastened in regulation manner," she said after the flight.

$5000 Offered for Glide Across Channel

A PRIZE of $5,000 has been offered to the first British pilot who accomplishes a crossing of the English Channel from England to France or vice versa, in a glider. The launching must be done by the usual methods, and any competitor who is towed except for the launching is automatically disqualified.

Pilot Detects Fire from Air and Gives Alarm

ON a recent night Dick Merrill (mail pilot for Eastern Transport, Inc.) sped at his 110-mile pace from Atlanta to Spartanburg, then to Greensboro. There he discharged local mail, took aboard letters that were to be in New York by daybreak and hurried into the air again. He no sooner had gained his altitude than he noticed a glaring red blaze in the little town of Monticello, 14 miles north of Greensboro. The pilot knew what to do under such circumstances, for on other occasions he has discovered fires during his long night run.

His motor was opened wide and the nose of his airmail plane turned toward the blaze. Down he came, wires screaming in the wind and the motor setting up a staccato that would awaken the soundest sleeper. He zoomed over the roof, turned, dived again, circled in a close arc over the building. In a few moments he saw someone run out of the house. He had done his job. Dick Merrill pointed his plane upward and hurried away with the mail. He had no way of ascertaining the name of the family, but he had successfully warned the sleeping owner that his house was afire.

Harvard Student Jumps from Plane Without Parachute

YEARS ago a pilot could get his name in the papers by jumping with a parachute. Those days are almost over. To make space now, one has to jump from a plane *without* a 'chute.

Horace Williams Fuller did exactly that. He is a commercial pilot of four years standing, a senior at Harvard, and son of a wealthy manufacturer. While on a pleasure trip recently, he leaped from his Gypsy Moth biplane minus a parachute.

When he picked himself up and had time to check up and see if any of his anatomy was missing he was surprised to find that he was entirely uninjured with the exception of skin bruises on his hands. These were from his frantic effort to check his fall by grabbing at the branches of a pine tree.

On his latest eventful flight Mr. Fuller took off from the East Boston airport, planning to witness a baseball game at Groton, about two miles from an emergency landing field. He made a perfect landing and hired an automobile to take him to the game. A heavy rain had set in in the meantime and the game was cancelled. Returning to the plane he got the motor started but it sounded rather "soggy" to him. Believing that it was only from the rain and cold he warmed it up and taxied for a takeoff.

Twice he brought the plane down to avoid under shooting the field. The third time the plane got off over the fringe of woods. At about 150 feet there was a violent backfire and almost instantaneously flames leaped around the engine and the wings. The cockpit about this time was the hottest place that Mr. Fuller had ever experienced.

Without time to bank and land on the field Mr. Fuller decided to pick the best of several possible places to crash which the scrub oak and pine woods in front of him offered. So he guided the plane directly into a stand of thick pine. The plane tore into an 18-inch thick tree about 35 feet from the ground.

Just before the impact Mr. Fuller "hopped out." He had slid down the branches of pines when in his boyhood so this was not an unusual experience. His fall was broken by the supple branches so that when he reached the ground it was not much harder than with a 'chute.

Mr. Fuller took the incident lightly. He declared, "When the wheels of the plane left the ground I was sure something was wrong for the motor wasn't hitting steady. There was considerable sputtering and backfire. Just as I was climbing above the tree tops I realized I would have to crash for after a loud backfire, flames enveloped the plane. I saw a big evergreen tree and headed for it. It was getting hotter and hotter in the cockpit. Just about as the plane hit the tree I dropped out and fell through the branches to the ground. I grabbed at everything in sight, slowed down my fall so that I didn't land too hard. Outside of skinning my hands I wasn't scratched."

Dolling Up Your Power Glider

By J. B. ROBERTS

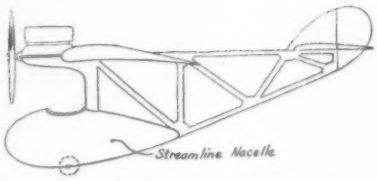


Fig. 1. A light basket type nacelle can be applied to a power glider to reduce head resistance.

You can turn your football into a landing wheel. Use your handkerchief as an air speed indicator.

YOUR power glider need not remain bare and ugly. It is as susceptible to accessories and extras as an old Model T Ford. The question is not what improvements can be made but rather what can be best left off. Not many alterations or additions are necessary or even advisable when the secondary or primary trainer is used as a glider, but when we put power aboard, then conditions change because the speed runs up to a respectable figure.

The very low speed attained by a glider makes its head resistance almost negligible when gliding by gravity, or at least the resistance is so low that it does not ordinarily justify the addition of weight necessary for streamlining many of the parts. To streamline a glider in the sense that an airplane is streamlined would add anywhere from 10 to 20 pounds to the empty weight and this would not be admissible. However, when the glider is propelled at a speed of from 50 to 80 miles per hour by an engine, we have an entirely different proposition, and streamlining becomes of increasing importance.

The power required for the propulsion of a ship varies roughly as the "cube" of the speed, hence to double the speed, as from 30 to 60 miles per hour, would mean an increase of 2x2x2=8 horsepower, approximately, so far as the head resistance or parasitic resistance is concerned. Thus, if 2 H. P. would successfully propel the glider at 30 M. P. H., then nearly 16 horsepower would be required at 60 miles per hour. The answer, of course, is to cut down the head resistance as much as possible, and as the body of the pilot is most productive of this loss, we must consider streamlining his body in a light nacelle.

In Fig. 1, a light basket type nacelle is shown applied to a powered glider, this particular nacelle being built up in basket fashion out of reeds or rattan strips woven together with paper. This construction is exceedingly light, and as the rattan is limber and tough, there is no danger from splinters as would be the case with wooden members. To employ wood strips would be a menace to the safety of the pilot in a hard landing and should not be tolerated for a minute. As shown, the longitudinal members of the nacelle are rounded out to approximate streamline form (See Fig. 2) and are then woven in and out with strips of stiff strong paper. The only purpose of the paper is to hold the rattan strips in position and to provide a foundation for an outer smooth surface. The method of weaving the paper and rattan is shown by Fig. 3.

AFTER the weaving has been completed, the assembly is given a thick coating of waterproof glue to hold the parts together, and after this is dried, an outer skin of paper is pasted on to form a smooth and non-resistant outer skin. After this job is completed, it may be painted the desired color, followed by three or four good coats of spar varnish inside and out to protect the paper and glue against atmospheric moisture. If carefully performed, this makes a very presentable job and one that will prove a protection to the pilot as well as a means of reducing resistance.

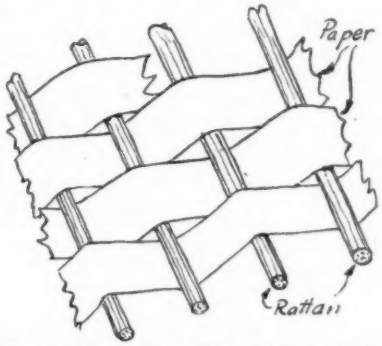


Fig. 3. The reeds or rattan strips are woven together with strong paper in basket fashion.

A streamline form is blunt in front and reaches a maximum diameter about one-third the length measured from the entering or front nose. From this point it tapers down to a thin point in the rear so that the body leaves the air with as little disturbance as possible. There are a great number of such forms, but the general shape illustrated by Fig. 2 will be sufficient for your purpose. Do not make the mistake of building a spherical or globe shaped nacelle, because the resistance of a sphere is exceedingly high and is not truly a streamline form.

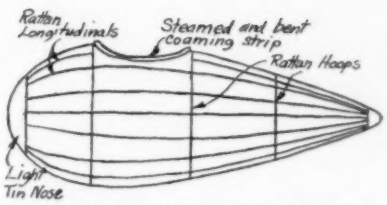


Fig. 2. Skeleton view of the nacelle showing how the rattan strips are arranged.

Long wire stays create a considerable resistance at high speed, especially when they are allowed to vibrate or flap. This often justifies the use of another series of light braces if they will hold the cables rigid. Another point to streamline is the gasoline tank if mounted on the upper wing and exposed to the propeller slip-stream as most of them are arranged. Even a small tank moving through the air at 60 miles per hour presents a considerable amount of resistance that had best be avoided. Again, it is best to keep the control wires out of the wind as much as possible by running them along the longitudinals of the outrigger or even concealed in the outrigger or within the wing structure where possible.

As time goes on, the powered glider pilot will find that a more efficient landing gear is of importance. The simple skid employed for gliders is all very well when a landing is made at a few miles per hour, but when an emergency landing is made necessary with a power driven rig, there is a considerable concussion due the impact at high speed. In the early German gilders, landing wheels were made of footballs, a wheel that was at once light and an efficient absorber of shocks, A shaft is run through the football so that it can revolve, and as much of it is concealed within the nacelle as possible, to avoid head resistance. There is no doubt but some such arrangement must be made in the future.

IN time to come, the power glider will be of the pusher type with tubular tail booms in place of the present lattice type outrigger. If made as a pusher type, then the pilot has clear vision ahead and is not endangered by the close proximity of the propeller as in present machines. This, of course, calls for double booms for carrying the tail surfaces, and to avoid the high resistance of the conventional lattice type, these booms should be of the tubular type, running straight out to the tail without external bracing of any sort. This is at once simple and effective.

Aileron flaps at the wing tips and forming the rear edge of the wings are

not very efficient at the best, and when used near stalling speed, as they are with gliders and power gliders, they are not the best type. To be effective at low speeds, the ailerons should be entirely separate from the main wings and should also be of an approved wing section so that they will give the best results with a minimum of resistance. In a biplane machine they should be located at a point about midway of the two wings or else extended beyond the main wings where they will work in undisturbed air. This fact was proved at the Safety trials of the Guggenheim contests.

On powering a glider, it should be particularly noted that an underpowered glider is as dangerous as an underpowered airplane without reserve power for climbing or fighting adverse winds. The present tendency is to install plants of from 5 H. P. to 10 H. P. rated output, and while this may be all very well in calm weather, yet it does not give sufficient speed in case that a strong breeze rises while in flight. If the speed of the machine is not at least equal to the speed of the strongest gust, then it must inevitably be driven backwards on landing or else land at a high speed with the wind on its tail which is almost equally dangerous.

In their early experiments with gliders and light planes, the Wright Brothers devised an air speed meter that was as simple as it was ingenious. This instrument consisted of a short length of rag or string, fastened at one end to a forward point in the plane so that it would flutter in the breeze. It gave instant notice of any sudden change in the speed or any change in the attitude of the ship in respect to the air stream, and was a valuable device that present-day glider pilots may well copy.

Office Boy Wins Pilot License

OFFICE boys have in the past risen to many high posts in the industry of the United States. Some have become bank presidents, others railroad presidents and some have won memberships on the New York Stock Exchange. One field remained in open competition and recently a red-headed lad won the distinction of being the first to break into the ranks of those licensed by the United States Department of Commerce to fly airplanes.

Inspector George D. Ream first passed Ralph R. Burr in the written examination and later in the flight test for a license as a Private Pilot of licensed aircraft, the tests being held at Curtiss Airport, Valley Stream, N. Y. When Burr returned to his office this afternoon with his reason for being late, he had added a new one to the old list of "grandmother's funeral" and like.

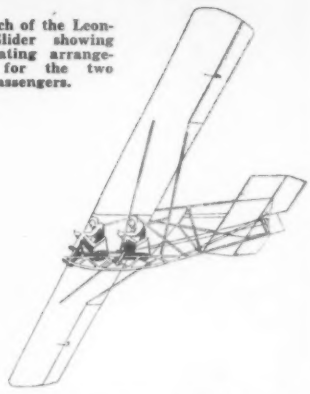
Now You Can Take Your Girl for a Glider Ride

THERE are many gliders on the market today, but a two-place glider is still a novelty. The Leonard Motorless Aircraft Co. have come out with reinforced steel tubing glider, two-place and *dual-controlled*. It sells for $550.

The ship can be operated from either seat and is particularly adaptable for training purposes. It can also be used for carrying passengers.

The entire fuselage is constructed of steel tubing, welded at all joints and with balsa wood inside. The steel tubing gliders weigh less than gliders of similar size constructed of wood. The reinforced construction allows the Leonard Glider to withstand the stress of automobile towing.

The wings are cloth covered and braced at intervals with spruce ribs. The specifications: weight 210 lbs., wing span 34 feet, wing chord 5 feet, aspect ratio 6.8.



A sketch of the Leonard Glider showing the seating arrangement for the two passengers.

The dual-controlled primary trainer will land at 19 m. p. h., has a rate of climb of 800 ft. per minute and a gliding ratio of 15 to 1.

Aviation Trainer Teaches Students to Fly at Zero Altitude

THE LINK AVIATION TRAINER is a new device to teach "grounded" students how to fly. It is used by flying schools, and also by amusement parks. Enterprising individuals have placed this trainer on display and offered prospects 2½ minute rides for 25c.

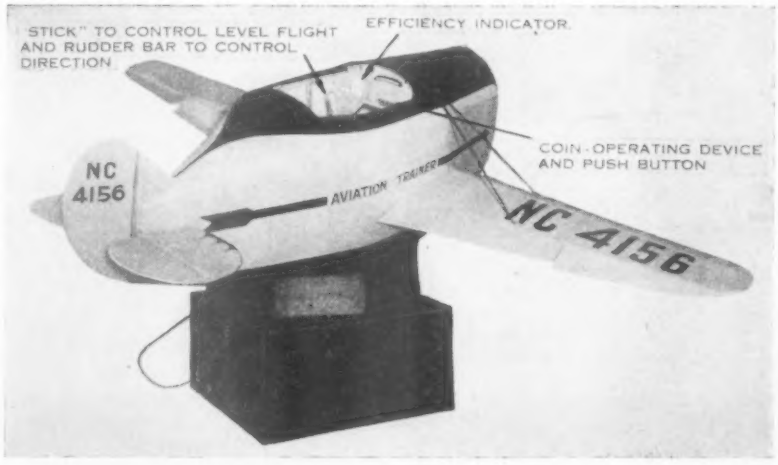
The Aviation Trainer consists of two units; the first, an airplane in modified form; the second, a really remarkable compressed air mechanism.

The plane is mounted on a table which rests upon powerful pneumatics. A switch sets these pneumatics into automatic operation, duplicating the action of air currents and causing the plane to "bump" acutely at all angles. The effect on the plane is the same that would be encountered in the air by an uncontrolled ship, with the exception, of course, of dives and spins and other extremes. The mechanism may be regulated to produce the effects of smooth and rough flying.

The plane itself closely resembles a real ship, is constructed of the same materials and has the same finish. The wings and fuselage are modified in size to conserve space. The cockpit is a very close copy of that of a genuine ship.

The "stick" and rudder bar operate on the same principle as those in a real plane and enable the operator to control the Trainer in the same manner. They are connected with a simple valve mechanism which actuates its own set of pneumatics which, when properly controlled, offset the action of the "air current" pneumatics, and keep the ship on level flight.

A standard part of the outfit is an efficiency indicator, equipped with a dial numbered from 0 to 15. This device automatically scores a point against the operator, up to a possible fifteen within any given time, every time he gets off level flight. The degree of his efficency or progress may be determined accordingly. The form of the dial is optional. It may be either a small one on the instrument board, or a large one that may be placed at any position convenient to the "flyer" or instructor.


"STICK" TO CONTROL LEVEL FLIGHT AND RUDDER BAR TO CONTROL DIRECTION
EFFICIENCY INDICATOR
COIN-OPERATING DEVICE AND PUSH BUTTON
NC 4156
AVIATION TRAINER
NC 4156

Practical Lessons in Flying

By JOHN B. RATHBUN

This is the second lesson of the home-study course specially written for POPULAR AVIATION *by this well-known author and engineer.*

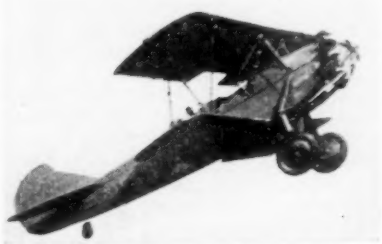
WITH a total of twenty minutes "dual" to his credit, during which time he had his feet on the rudder-bar for about two minutes, Bob already felt like a veteran pilot—a rather dangerous state of mind to be in at this stage, if not corrected. His every movement betrayed this attitude as he stalked majestically up and down in front of the hangar, distributing patronizing glances between the new students and the ground crew who were making ready for the day's activities. While a certain degree of self-confidence is desirable at the beginning, yet egotism and over-confidence are bad companions in the cock-pit.

"Quite cocky this morning," thought Ed the pilot-instructor as he took in the swagger, "if this keeps up we will have to take him down a notch to make life safe for democracy. Mebbe a nice tight little spin might help to reduce the local swelling—it generally does." However, no treatment of this sort was necessary for the student's good common sense came to the rescue and he lost a great deal of his self-assurance as soon as he returned the pilot's "good morning." The sight of the ship being rolled out of the hangar also tended to check his superiority complex as it does with most kiwis.

"Well, let's go over and see how much of the ship our ground crew and our alleged mechanics have left us to fly with," quoth the instructor, "perhaps she is all there and perhaps she isn't—we shall see." Fully understanding that almost anything might have happened to the ship since he left her the day before, particularly with fifty meddlesome and curious students around the hangar, Ed left nothing to chance and made it a practice to examine all possible trouble making points minutely before taking off. He had witnessed too many accidents due to the negligence of the mechanics or to tampering by idlers around the field to take any chances.

"Watch me closely and get my routine," he called to Bob, and then rapidly checked up on the gasoline,

Ed left nothing to chance and made it a practice to examine all possible trouble making points minutely before taking off.



"I will just give you an example of a stall now that we are up to 3000 feet and maybe I will give you an example of a spin if your breakfast is well settled."

lubricating oil and water. He then tried the controls to see that they were functioning properly, looked at the stays and control wires at the point of connection, gave a close scrutiny to the landing gear, and finally found something that rewarded his vigilance. He did not attempt to conceal his discovery, but called both to Bob and the nearest mechanic.

And lying right there on the floor of the cockpit was a large empty grease can wedged in between the rudder-bar and the clevis of the stick, jamming the rudder-bar and interfering with the aileron movement. Ed had heard something drop and roll when he had given the ship a customary shaking, and there it was, the basic cause of a whole lot of trouble or possibly a crash. Ed's motto, "Shake well before using," had again saved the day. Anything loose, a fire extinguisher broken loose from its moorings, a cap or coat, loose tools, spare parts or parcels would have done the same trick, hence the advisability of shaking the plane to jar such things so that they will roll or rattle.

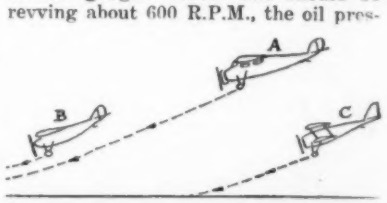
THE inspection was finally completed to Ed's satisfaction. The chocks were placed under the wheels, the engine started without a hitch and everything was nearly ready for the takeoff. While the engine was warming up, the pilot gave his little preliminary talk and at times regarded the engine which ran rough and irregularly at first but which smoothed up and ran better and better as the heat started to penetrate into the jacket water. "I wish some of those guys around here would slip a feeler-gauge under the tappets for a change and take up the clearance. The valves were ground ten hours ago and are now down to a seat," was his only comment on the engine.

"Now that you have seen a practical reason for inspecting ship before the takeoff, I wish to tell you that this inspection is required by the U. S. Department of Commerce Regulations. It is the duty of the owner to have a regular inspection made within each 24 hours preceding flight, and the results of the inspection must be entered in a log-book by a licensed airman under his signature. All of the parts open to inspection must be gone over carefully, and then the engine must be warmed up and the action of the engine instruments noted, such as the oil pressure gauge, the tachometer giving the engine speed, the water thermometer and similar instruments. Further, the owner must allow a government inspector to make this examination at any time on a licensed ship.

"And another point. After the engine has been run for 100 hours in flight it must be inspected by a licensed mechanic and the results of the inspection entered into the log-book and signed by the mechanic. This must be done regardless of how well the engine may seem to operate, and is the equivalent of the inspection that should be made on an automobile engine after it has completed each 10,000 miles. If we figure that the ship averages 100 miles per hour, then 100 hours of flying would represent 10,000 miles. When the mileage is considered, this is no oftener than with an automobile engine. The worst feature of this overhaul is the fact that it will average about $75.00.

"NOW, it will be quite a time before you will be allowed to make a take-off or land, but I am going to start giving you some of the rules. In the first place, you must keep a good sharp lookout for other ships that may be running around before you start, always remembering that a ship making a landing has the right-of-way over any other ship according to regulations. You must wait until a landing ship comes to rest before taking off, or else get out of her way if you are in the air. She may be compelled to come down through mechanical trouble while you are not compelled to go up at this moment, and besides she may not be under control and may not land exactly where the pilot is trying to spot her. This is Rule No. 1, Act No. 1, Provision No. 1, in taking off.

"Just hop over and open her up a little more now, and look at the oil gauge pressure and the water temperature. There, that's it—no faster. How do the gauges read? She should be revving about 600 R.P.M., the oil pres-

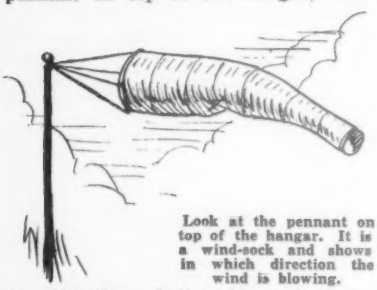


You must wait until a landing ship comes to rest before taking off, or else get out of her way if you are in the air.

sure should be about 40, and the temperature should be about 120, is that right?" The pilot beckoned for Bob to come back, and then continued.

"While it is always best to take-off into the wind, to gain the advantage of the air-speed under the wings, yet it is frequently necessary to take off across wind, particularly in a narrow field. This takes more running and faster running than against the wind. This also calls for more work with the controls, particularly if the wind comes in gusts, for the wing tip to the windward gets more kick than the other, and again, the wind on the vertical surfaces makes the ship "crab" sidewise so that this is hardly a job for a beginner. Just as an illustration, I am going to take off across the wind for your particular benefit, and if she starts crabbing don't get scared even though the ground does seem to come in at half-dozen directions at once."

Ed nodded and they both climbed in, adjusting their safety belts and getting ready for the battle. The headphones were connected, and then they taxied out and took their position so that the ship was mostly across wind and only slightly into the wind. "Look at the pennant on top of the hangar," said



Look at the pennant on top of the hangar. It is a wind-sock and shows in which direction the wind is blowing.

the pilot through the phones, it shows that the wind is from the south while we are pointing nearly west or nearly at right angles to the wind. If a beginner should try to take off in this manner there would be a nice crash. If you will watch the stick you will see that I am going to do a whole lot of work back here to keep her from scratching her wings off on the ground."

THEN Ed gave her the gun, the engine roared, and she started galloping down the field like a scow in a cyclone. She wallowed and rolled, the ailerons and wing tips flicked continuously and there was a side-to-side yawing and tail swinging that was entirely lacking on his first trip when they took off into the wind. This time they had to run about twice as far as they did on the first trip before there was air-speed enough under the wings to pick her off the grass, and when she did break loose—zowie, what a crab to the right!

Slap down went the right wing tip, then "whap" up came the left, then down with the nose, up with the nose and then the whole earth seemed to slide sidewise. Then once again she took a slide with a gust for about tnirty yards so that the motion of the ground seemed from the side instead of from the front as usual. Then at about ten feet off, she got a good smack in the tail from a side gust that swung her around through a considerable angle so that she crabbed along sidewise like a frisky saddle horse. Bam! Another gust nearly drove her down to ground, but the game little ship stuck to her job and battled through it until she got up to about 100 feet where Ed turned her more into the wind. The air was less turbulent up here and Bob had a chance to collect his thoughts although the ship was still quartering the breeze.

While they were still travelling west, yet the ship's nose was pointing into the southwest, a fact that recalled one of the diagrams of the ground school to mind. Bob remembered how the ship pointed along a "resultant line" part way between the flight direction and the wind direction as in Fig. 4. In this

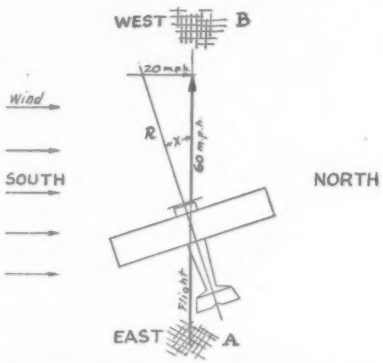


Fig. 4. The plane is going to B, but points its nose along line R to counteract the 20-mile cross wind.

diagram, the plane in flying from the town (A) to the town (B) is subjected to a cross wind from the left, hence the center of the plane lies on the resultant line (R) so that it is apparently moving sidewise. Here the wind velocity is 20 miles per hour while the velocity of the ship is 60 as indicated. If the wind velocity were higher, then the ship would make a still greater angle. This was now very apparent to Bob by this actual experience, and it was a peculiar sensation to watch their progress over the ground below them.

"Well, old-timer, how did you like that little exhibition," said the headphones, "do you think you can bounce her off across wind yourself the next time? You see now, and you will probably remember this for a long time, why I am always lecturing you fellows against taking off across the wind. It is not impossible, but it is never advisable, unless the field conditions are such that there is no other way out. We had a dozen opportunities for swiping off the wings or the landing gear but she managed to stay clear.

"Now we will climb a little and I will show you something else about this speed business for we have a good south wind for the demonstration. At this height the velocity is greater and the air is steadier than near the ground, so let us say the wind is blowing from the south at 30 miles per hour. I will now turn straight into the wind and throttle down so that the air-speed meter indicates about 40 miles per hour. Look down."

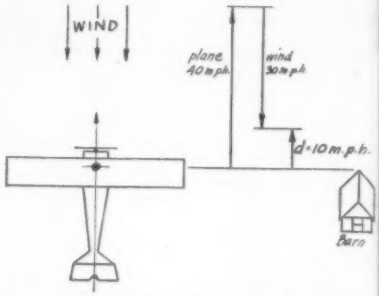


Fig. 5. The plane is going 40 m. p. h. air speed, but is bucking a 30-mile head wind which results in a 10 m. p. h. forward speed.

Directly below was a farm building and they barely seemed to move past it, for while the ship was moving through the air at the rate of 40 miles per hour, the wind was also blowing them back at the rate of 30 M. P. H., so that their actual speed over this point on the ground was the difference of the wind speed and ship speed, or only ten miles per hour. They seemed to just barely crawl along over the ground, and yet the speed of the air over the wings was still 40 miles per hour. Their progress was along the ship's center-line and there was no side motion.

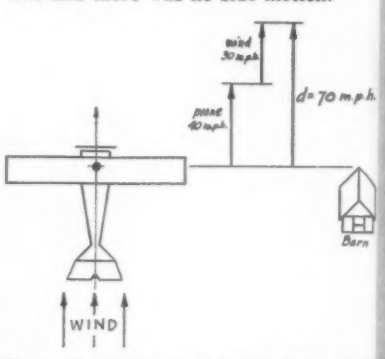
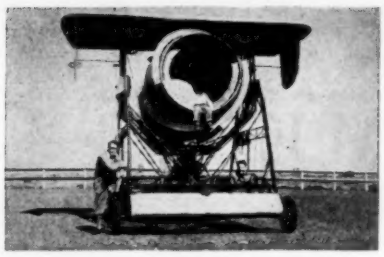


Fig. 6. The plane is going 40 m. p. h. air speed, but has a 30-mile tail wind, resulting in a forward speed of 70 m. p. h.

"NOW I will turn her around so that we will travel with the wind, or toward the north, and you will see a difference if you watch that building." Around she came on a steep bank and started north. Now things on earth certainly did move, although the air speed of the ship was still held at 40 miles per hour. The wind was blowing 30 M. P. H. and as they were moving 40 M. P. H. faster than the wind, they were whooping past the buildings at the rate of 40 plus 30 or 70 miles per hour. "The great lesson to learn from this experiment," said the pilot, "is the fact that there is no direct relation between the air speed over the wings and the ground *(Continued on Page 70)*



The Strangest Plane in the World

TWO views of the strangest airplane in the world, which will soon be given its first test. At left, the barrel-like "propeller"; and at right, a front view of the cylinder which will be whirled by the 80-horsepower motor beneath, at a rate of 300 revolutions per minute. The inventor, Paul Maiwurm, who calls the craft the "Fly Worm" says it will fly 60 miles an hour. Helical fins inside and outside the drum, or cylinder, are expected to cause a cyclonic condition—"pushing the air back"—to raise it upwards and carry it forward. It is said that small models of the machine have made successful flights.

West Coast Pilot Nearly Flies Through Tunnel

By Walter E. Case—Pilot for West Coast Air Transport Corp.

DURING the Spring of 1928 Pilot A. W. French, (now with Standard Oil Company) and I paired off on the Seattle, Washington to Portland, Oregon, run for West Coast Air Transport Company. We were flying a tri-motor Bach eight-passenger airplane, making two round-trips daily between these two points. Monday and Tuesday Al and I would work together. Wednesday and Friday I worked the run with a mechanic, acting as co-pilot. Thursday and Saturday Al and a mechanic worked the run.

The trip I am about to relate happened on a day when Al and I were both at the controls. The day was very stormy and the visibility was extremely poor, but we decided that we could take off from the Swan Island Airport at Portland, fly low down the Willamette River to the Columbia River, thence through the Cowlitz River Canyon and follow the railroad through low places into Chehalis, Washington, and on into Tacoma and possibly into Seattle—so we took off.

Now, the fault was all our own inasmuch as the bank-and-turn instrument had gone out of commission several days previous, having been taken out of the ship and sent to the factory for repairs. The above instrument is used to show the position of the airplane relative to the ground while flying in fog.

We were just nicely off the field and over the Willamette River when we must fly up into the fog to avoid hitting a railroad bridge. As we dropped out of the fog on the other side of the bridge, I saw on my side the smoke-stack of a mill so I called to Al to pull her up and I jammed the throttles wide open. He did pull her up and we were again completely enveloped by fog and, not daring to come down for fear of hitting some trees, buildings or some other hazard, kept on climbing, hoping to climb up through the fog.

Al did very well considering he had no bank-and turn instrument. The altimeter showed eighteen hundred feet above sea level and just about this time the airspeed began to increase, jumping from sixty miles per hour to one hundred seventy-five, altimeter dropping very rapidly and no instrument to show us the position in this fog. At the rate we were dropping it would only require two or three seconds more to hit the ground and pulverize the plane, the three passengers and we two pilots.

I remembered the old instructions—when in a tail spin get your controls in neutral. Now, we had both flown this plane enough to know that it would level itself out if we took our hands off the controls and that is just what we did—turned loose everything.

The ship stopped spinning and took a straight dive. I reached out and pulled back on the yoke (the part of the control the wheels fasten to, to give lateral balance) and slowed the ship to seventy miles per hour on the airspeed, and slowly pushed the throttles open maintaining seventy to eighty miles per hour again.

We had the ship under control at an elevation of two hundred feet but, the question was, how long could we keep her under control in this fog and without a bank-and-turn instrument, so we dropped her just a **little, bit by bit until** we were barely missing the tree tops and could just get a glimpse of them as they went by. We picked up a railroad which runs from Vancouver, Washington, into Portland, Oregon, where it goes through a tunnel.

Now, the unfortunate part of following a railroad in thick weather is the fact that some of these railroads do go through tunnels and I know of several pilots who have also tried to go through the same tunnels with no success. That is just what we came very near doing. Al again had the controls and I was caressing the throttles. Al hollered—"give her everything, Walt"—I did, and none too soon, as we had followed this railroad right into the mouth of the tunnel! Al pulled the controls back and zoomed out of there, trees and banks on both sides of us. It took us thirty minutes to get into the field and we were both completely worn out by the strain.

I have often wondered if our passengers realized just how close they came to facing their Maker on that day.

I have written this article to impress upon you the dire need of instruments and any pilot who will knowingly take off in the face of like conditions without the proper instruments is only courting disaster.

Dornier DO-X Will Bring 14 Passengers to America

FOURTEEN passengers and a pay load of 10,000 pounds will be aboard the huge German flying boat, DO-X, when that craft flies the Atlantic to the United States this summer.

C. H. Schildhauer, former Naval officer and once holder of the endurance record, will pilot the great flying boat across the ocean.

The craft will touch several European ports, and about August 9 will begin its trans-Atlantic flight, coming by way of the Azores and Bermuda.

According to the plans, no effort will be made to effect a spectacular flight across the ocean, but rather the flight of the DO-X will be a demonstration of the practical use of such aircraft in transoceanic commerce. A stop is scheduled at present for Bermuda, but all plans are not yet definitely established.

An entirely new wing has been built for the DO-X to take the twelve Curtiss Conqueror engines with which it will be equipped, and the sub-wing which formerly held the motors has been eliminated. The motors, in six sets of pairs in tandem, will be enclosed in nacelles which will allow any pair to be cut out and worked on while in flight.

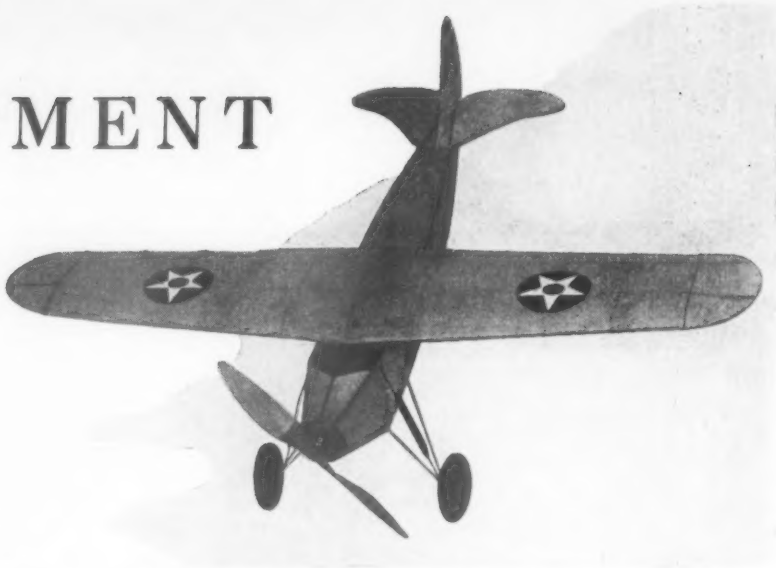
The DO-X handles like a twin-motored plane. There are two throttles on the bridge, one for each of the six banks of motors. In addition there are individual throttles for each motor in the engineers' room. The two tachometers in the bridge each show the average revolutions per minute of six motors. The bridge is like that of a steamship, with even a chart table in it.

Air transport operators are looking forward with tremendous interest to the flight of the DO-X. The craft made history when it took 169 persons aloft at once, and this trans-Atlantic flight promises to be one of the most significant ocean crossings ever made. When it is recalled that the hull of the DO-X is larger than the hull of the Santa Maria, in which Columbus discovered America, the importance of the flight can be realized.

MODEL DEPARTMENT

How to Build the Fokker Super Universal

By
JOSEPH S. OTT



This is a photo of the original Fokker Super Universal model which now hangs in the offices of POPULAR AVIATION. It is an excellent flying model as well as a beautiful reproduction of the real Fokker and has caused many favorable comments from all who have seen it. Since completing this first model, Mr. Ott has changed the design of the landing gear struts to that shown below. It is the newer design that is described in this article.

THIS month we are going to build a Fokker Super Universal. It is modeled after a popular plane in use on commercial airlines. The single motored Fokker belongs to the same family as the famous 32-passenger transport, the F-32.

The model completely finished should weigh between 1 1/2 oz. to 2 oz., not over 2 oz. This is not designed to be a duration model but instead a model that will stand a lot of rough handling and fly consistently on each occasion. This model that was built in conjunction for this article has made numerous flights of 450 feet and on windy days close to 700 feet.

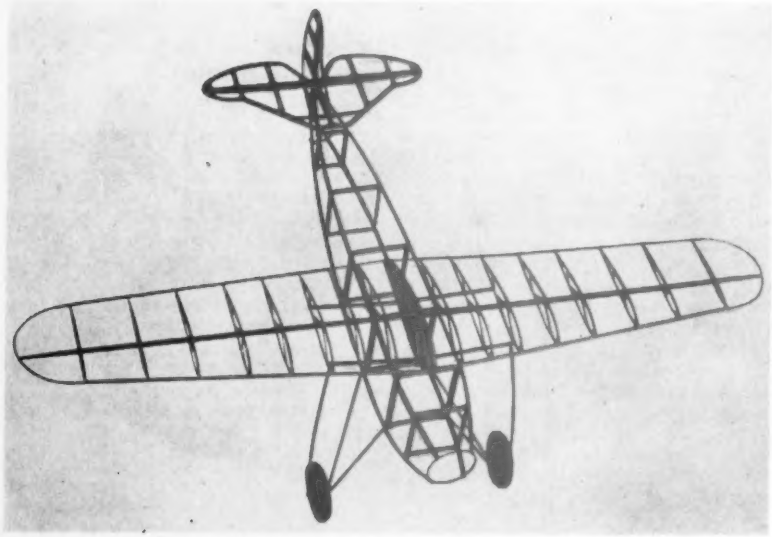
It must be remembered that as soon as the power is expended the plane will immediately make a landing because of the weight carried.

The photograph of the finished plane was taken only after the model had made at least well over thirty flights in all kinds of weather.

Before trying to fly it, balance the complete plane on your forefinger and try to locate the center of gravity. Then move the wing to the closest position of balance. Make a couple of glides until you feel that the plane is balanced. A few short flights can be made by giving the rubber about 50 turns. After these preliminary trials, and you feel the model is all set wind it up to the limit until three rows of knots are visible and on the rubber. This plane will rise off the ground very easily and will climb rapidly.

Suggested Order in Which the Different Parts Should Be Built

1. Left side of Body.
2. Right side of Body.
3. Top side and underneath Cross-pieces.
4. Nose Plate of Fuselage.
5. Wing Adjusting Beam. (Pine)
6. Cutting out Ribs.
7. Assembly of Main Wing.
8. Rudder and Stabilizer.
9. Landing Gear.
10. Wing Clips, Shaft and Hooks. (Piano Wire)
11. Motor Stick.
12. Propeller 10″.
13. Covering Main Wing.
14. Covering Rudder and Stabilizer.
15. Covering Body.
16. Treating Paper so it will not warp model too much.
17. Doping complete Model.
18. Rubber for motive power. (1/32″ x1/8″)
19. Dihedral. Its effect and use.
20. General Flying Instruction.



Material for Fokker Super Universal

Glue, 2 oz.
Banana oil, 2 oz.
Paper, 2 sheets of Japanese No. 2.
Wheels, 2-1/4″ built up out of Balsa.
Propeller block, 5/8″x1″x10″ long, Balsa.
Piano Wire, 24″ of No. 13. (.032)
Bamboo, 12″ lengths, 4 each.
Motor Stick, 3/16″x1/4″x15″, Balsa.
Wing Adjusting Beam, 1/8″x3/16″x 8″, Pine.
Nose Block, 3/8″x2″, Balsa.
Hangar, 1/32″x3/32″x1″ long, Bronze.
Washers, 1/32″ hole 1/8″ outside, Steel.
Rubber, 1/32″x1/8″ 12 feet.

Rib Stock, 1/16"x1-1/4"x24" 2 ea., Balsa.

Body Longerons, 1/8"x1/8"x24" 8 ea., Balsa.

Wing Beams, 1/8"x3/16"x24" 2 ea., Balsa.

Entering Edge, 3/32"x3/32"x24" 1 ea., Balsa.

Trailing Edge, 1/16"x5/32"x24" 1 ea., Balsa.

Construction of Model in Detail

Materials specified above should be cut to sizes as shown by scale on the drawings or as called for in the following article.

BODY: Left Side, Right Side

MAKE a full size sketch of the left side of the body on a smooth piece of board. Cut all the parts to the proper length and hold in place with pins or very fine point needles. Apply the glue to all the joints and allow to dry. Make the right side of the fuselage in the same way, being certain that both sides are as much alike as is possible. This may be accomplished by cutting the left and right sides at the same time. After all the joints have dried the pins should be removed and with a knife or razor blade the sections should be cut away from the board. Balsa 1/8"x1/8".

Top Side—Crosspieces

Cut the top side and all the bottom crosspieces at the same time and mount all the parts into position with pins and glue in position as before. While pinning the parts down be sure that the body will not be warped out of shape. After dry, cut away from the board with a sharp knife. Balsa 1/8"x1/8".

Nose Plate

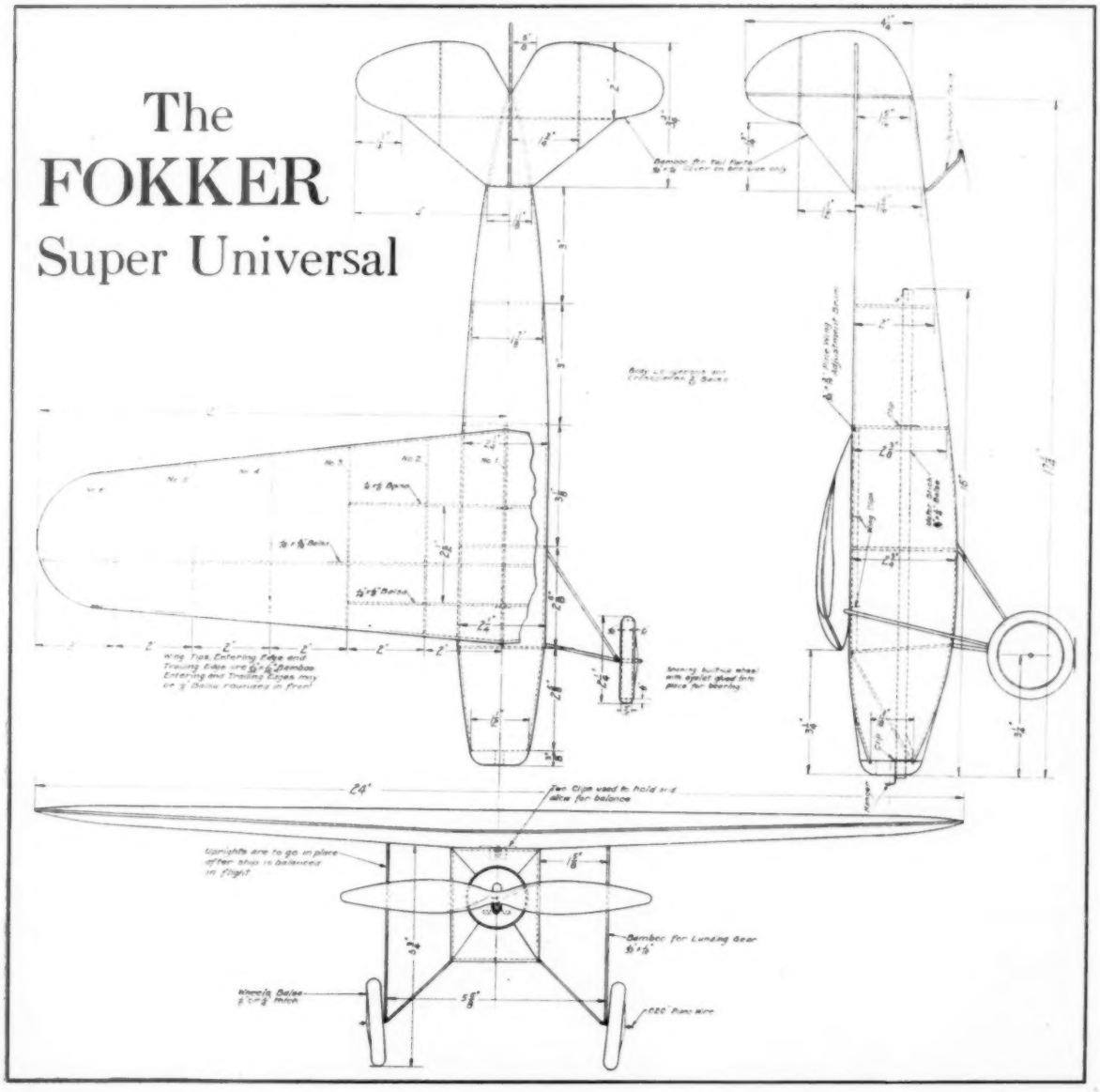
Draw a circle on the thick nose block and cut to size with a scrool saw or carve with a razor blade. Where the longerons will come into the plate cut small corners out so the 1/8"x1/8" pieces fit into the back side of the nose plate. The plate should not be put on the fuselage until the oblong hole is cut thru so it will allow the motor stick to be passed into place.

Wing Adjusting Beam

The wing adjusting beam is made of pine because the pressure of the clips that will hold the wing in place have a squeezing affect on the wood that would not allow a proper setting of the wing if it were made of balsa. The clips will make no grooves into the pine. This piece is not very long and the difference in weight is very slight.

Ribs

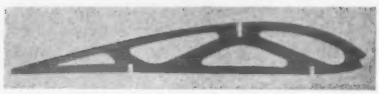
The ribs are not cut out from a template, though this may be done and



the templates used later or a group of boys can use the same set. The reason for this is when making one model there are only two ribs of each one necessary, and they can be cut by being traced off the full size sketch.

Wing

The wing should be assembled in the same way as the body by holding down with pins and gluing. The best way is to build it upside down on the board. In this way the spar can be held flat and straight, the ribs being placed into position from above. While the ribs are drying, the wing tips can be bent to shape. This is done by heating the bamboo over or rather by holding the



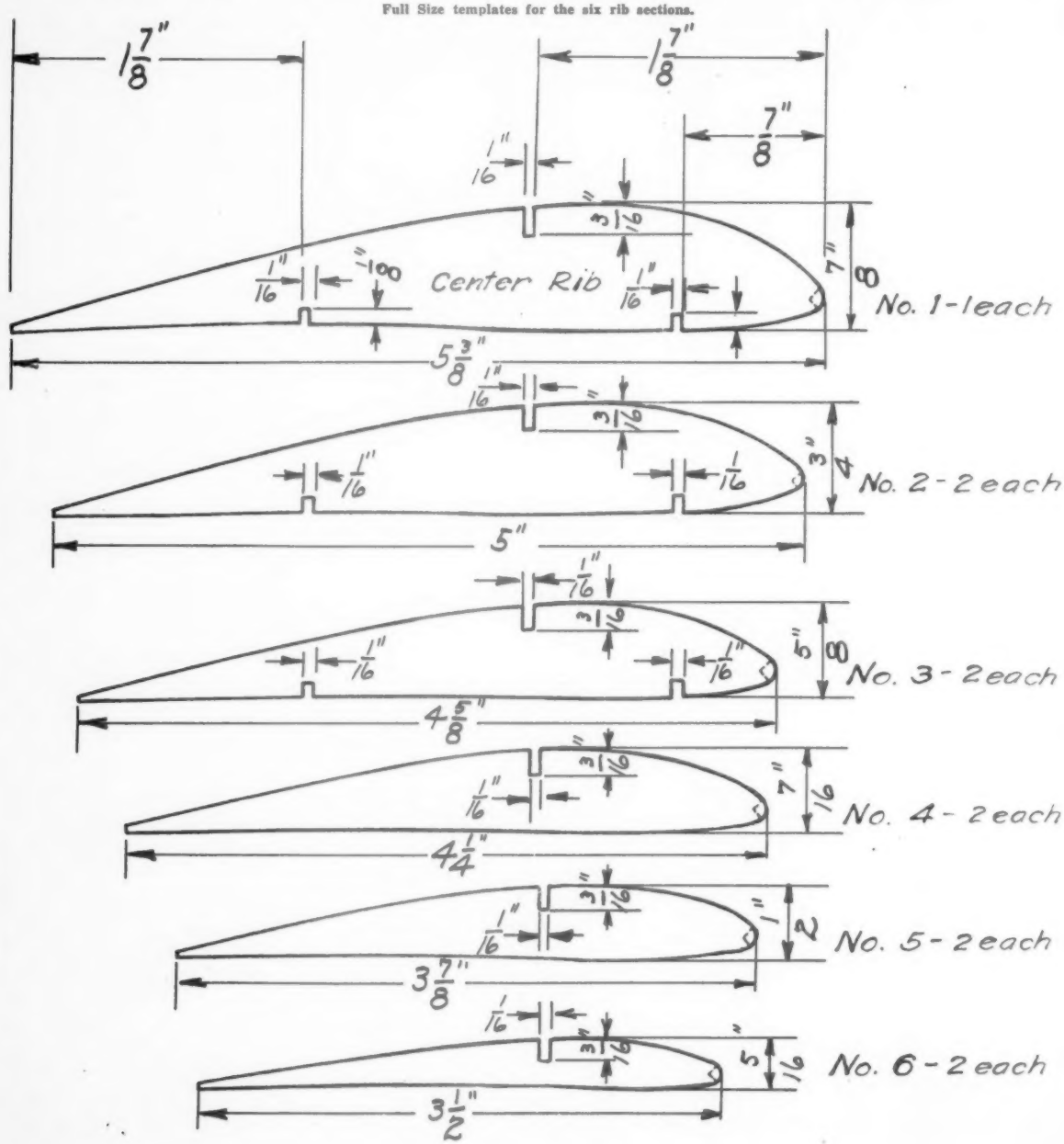
For extreme lightness the larger ribs may be cut out as shown here.

bamboo around the side of the flame of a candle or a Bunson burner. The bamboo should be moved back and forth and not held steadily in one position. The heat must be applied evenly around the part to be formed. If this is not done the pieces will look jagged and the curves will not be very uniform. Before putting on the wing tips, glue in place the entering and trailing edge. These should be blocked up in place while the wing is still on the board. A tapered wing is a little harder to build than a straight one but the finished tapered wing looks much better than the others. The wing tips should now be put in place. Be sure that they fit in place without forcing them to fit by pressure. This will tend to throw the wing out of shape. Use a little more heat and bend them to fit correctly. The two additional spars that hold the clips are put on.

Rudder and Stabilizer

All parts for the rudder and stabilizer are made of bamboo bent to

Full Size templates for the six rib sections.



Military Standards do make better pilots

FOR those who are considering a course of training in any branch of aviation and who cannot afford to make a mistake in the selection of a school, we urge investigation of the Spartan School of Aeronautics, an institution high in business character, but particularly an institution with a training system and a training standard unusually productive of results. ¶The Spartan School of Aeronautics has never relied for patronage on the name of a well advertised pilot. Spartan, on the contrary, built an institution from the bottom. Training planes are far above the average rating for flying equipment. Training schedules were carefully laid out in line with Government requirements. Instructors are steady, mature, widely experienced. And as a result Spartan was one of the first schools to receive approval of the U. S. Department of Commerce as transport ground and flying school. ¶From the beginning Spartan has emphasized the value of semi-military discipline in its relation with students and the necessity of military exactness in training. For it is generally agreed that military standards do produce better pilots. ¶Our 32-page, illustrated book gives a thorough description and an accurate mind picture of the Spartan School of Aeronautics. It also explains the Spartan extended tuition payment plans and our free transportation offer to new students. It will be sent free on receipt of the coupon, properly filled in.

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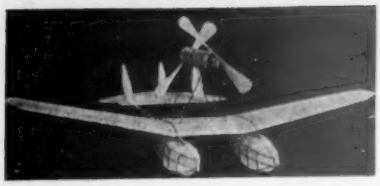
2 Ft. Flying Model



The illustration is a picture of a 2 ft. flying scale model built from our construction set. The Savoia Marchetti is a beautiful realistic model weighs less than one ounce, and has wonderful flying ability. The set contains all necessary materials and parts. Rib design and other parts are marked out on the balsa wood. Full size detail blueprint showing all parts is included with set. Any boy will find it easy to build and a great thrill to fly.

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shape while it is still in the wide form and trimmed down afterwards. Make full size patterns and lay the shapes down on them and glue together. When they are dry attach these completed parts to the fuselage.

Landing Gear

Parts for the landing gear are also made entirely of bamboo, with the exceptions of the wheels. The outer strut can be attached on the fuselage as seen on the photograph. The wire axle (.032") is attached with thin silk.

Wing Clips, Hooks, Shafts

All the piano wire used for the clips through are (.032") thick and should be polished or tinned to prevent corrosion. Full size sketches are not given. These parts should be bent to conform to the pieces they are to hold in place. The tools required for these are a good grade of side cutters and very handy pair of pliers is No. 32-5 Pexto obtainable at hardware stores. The nose ends of these are not tapered but are completely round and have two stops. Most all sizes of shafts can be turned out very easily.

Motor Stick

Balsa 3/16"x1/4" is used for the motor stick. The stick is held in place in the nose block with a clip and at the rear it sets in place into a section cut out to receive the end of the stick. The rear rubber hook is not fastened completely to the end. See the photograph of the model in the skeleton. Also note in which manner the section is built up to hold the motor stick.

Propeller 10"

Balsa wood is used, from which the propeller is carved. The block is 5/8"x1"x10". The center should be drilled on a drill press so the hole will line up true to the sides and that the finished propeller will not wabble. This will help the model to fly much steadier and give it a little more speed. Be sure that the blades are pretty much uniform to one another. Start carving at about 1-1/2" from the center of the hub. The hub should be thinned down (see photograph) but not so much that the shaft is liable to pull thru. When inserting the shaft and bending it back apply plenty of glue so it will not pull thru so easily.

Covering the Model Completely

The easiest part should be covered first, in doing this the hardest part will become a little easier thru the practice gained thereby. The body is the first part to cover, the two sides can be put on in one piece. That is, one side at a time, in one piece complete. The bottom may come next. When putting on the top side the portion that is covered by the wing when in place need not be covered. From the front of the wing to the nose block a very thin sheet of aluminum may be used. This may be about .006 of an inch thick. Bend into a circular shape and hold down in place by turning the lower edges over a little and having it catch underneath the longerons.

Shrinking Paper

Before covering the model a good practice is to shrink the paper a little before using. Pin it up on a stick and let a kettle of steaming water set underneath it until the paper begins to shrivel up. Use the paper in this form or a little ironing, not too hot will help to straighten it out, before applying. A light coat of dope will have the same result.

Doping the Fokker

In applying the dope or banana oil care should be taken not to make the model too heavy with it. Use considerable amount of thinner as most of this dries out spread it on lightly and evenly. Be sure that you do not go over the places already painted while it is wet as the tissue is easily pushed thru.

Rubber

A good fresh grade of rubber band of 1/32"x1/8" and a total of about six to eight strands will be sufficient to fly the completed model.

Dihedral

The tapered wing of this Fokker model gives a sort of natural dihedral that is sufficient to make the model fly very well and has good balance. Also the wing tips project back from the center looking down from the top and this adds to the forward stability. This is called Sweepback.

Summing the two up a model with about two inches of dihedral and about two inches of sweepback has a chance of about 75% better flying performance as against one that has neither of the two.

This does not hold so true of the twin pusher type of flying stick model. These models come under a little different method of balancing.

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WOMEN'S ACTIVITIES
EDITED BY LADY MARY HEATH

MISS AMY JOHNSON has just completed a flight from London to Australia in nineteen and a half days, finishing her remarkable feat last week. She reached Karachi in six days, two days under Mr. Bert Hinckler's record flight. She has been made commander of the British Empire for her wonderful performance, the highest award ever given to a woman in aviation.

On May the 15th Miss Amelia Earhart reached Washington, Bolling Field, escorting the Women's Advertising Club from Philadelphia in her Lockheed Vega.

On June the 2nd Miss Bobby Trout of Los Angeles claimed an American woman's altitude record for light airplanes. She climbed to a height of 15,200 ft. Her graph has been sent to Washington for inspection.

Miss Laura Ingalls, 25, of New York City recently beat her record of 344 loops by accomplishing 966 loops in a Moth Machine in St. Louis.

Miss Ruth Nichols has just been appointed Secretary to Col. Clarence Chamberlain's Technical Bureau. Her work in the past for the Aviation Country Clubs is well known.

The Central High School at St. Joseph, Mo. has a Girl's Section, as also has the George Washington High School in Los Angeles. Similarly the Southern High School in Baltimore, Md. has a Girl's Division with an automotive instructor and two lady assistants.

Mrs. B. Allison, late Miss Huyler Gillis, has recently taken her transport pilot's license. Other pilot licenses which have been taken were received by Mrs. Vocco of Evanston, Ill., Miss Elizabeth Tenney of Montclair, N. J., Miss Irene Hyde of Los Angeles, Mrs. Margaret Holcombe of Newport, Miss Ella V. Ogers of Connecticut.

Miss Morrilla Del Carveth recently sold three small Amphibian Savoia-Marchetti's for the American Aeronautical Assn.

The daughter of the Minister of Austria, Mlle. Loranda Prochnik is taking her lessons in flying at the Congressional Air Port, as also is Gladis Normand at Los Angeles.

Miss Mary Lincoln Beckwith, granddaughter of Abraham Lincoln owns a Waco Plane as well as a Moth in which she is approaching her commercial pilot's license time in Baltimore.

Mlle. Lena Bernstein, a Russian emigre in France, remained in the air 35 hours, 14 minutes and 55 seconds, thereby breaking the woman's solo endurance record by about 10 hours. Mlle. Maryse Bastie attempted to break her record on June 10th but only remained in the air under 23 hours.

Lady Grace Drummond Hay who recently flew around the world in the Graf Zeppelin is at present learning to fly.

Members of the Girls' Aero Club of the Wilmington High School visited Bellanca Field on the 4th of the month and were conducted on a tour of inspection by Miss Helen Brinton, their sponsor.

Miss Eleanor Smith, holder of the American Endurance Flight and the World's Altitude record gave a radio talk on the Curtiss Marine Trophy Race above the Potomac River on Saturday afternoon, May 31st. She is the first woman aviator to give such a public description during a racing event.

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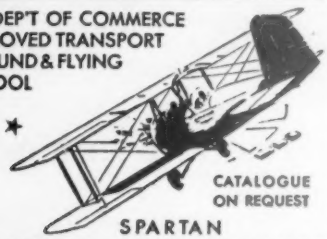

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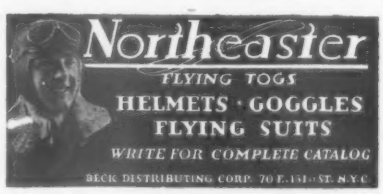

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(Continued from Page 37)

Instructions for Assembling Fuselage (Front Section)

SKID: (A-1) Mark the curve by scaling the blueprints and measuring down from the top at the intervals where the skid braces occur; drive nails part way in at these points, and then bend a long slender strip of wood around the nails to give a uniform curve. Make a heavy pencil line against the curved strip.

Place skid on saw-horses or in a vise and cut to the line with a key-hole saw, after which plane the cut smooth and at exactly a right angle to the board.

Mark the openings in the skid as shown, then bore a large hole (two inches in diameter if you have an expansion-bit) at each corner. Then saw from hole to hole with a key-hole saw and smooth off any rough edges.

RUNNER: (A-2) The front two feet of this piece should be soaked in water for at least two hours before bending. It should then be placed in a rack which will hold it bent at the front until dry. Next draw a straight line down the center, on both sides of the runner. On the top side measure 9/16" from the center line on each side and draw another line parallel to centerline. This will help you to get the runner on straight. Now drill small screw-holes every six inches along the centerline on the bottom, and ream them out so the screws (C-1) will be flush on the surface when tightened.

CASEIN GLUE: Note! Never mix more than you can use within twelve hours. Four or five tablespoonsful will be enough for the whole fuselage front section. Always apply plenty of glue to both sides of the joint to be made. Follow mixing directions on the can.

Apply glue to runner and skid. Fasten the front end of the runner to the skid with a clamp (always insert small wood blocks between clamps and the work) so that when the runner is bent it will not pull away from the front of the skid. Place the clamp so that it does not cover a screw-hole. Screw the front screw firmly in place, then each screw in succession toward the back, making sure that the skid is in the center of the runner. Leave the clamp in place and set the work aside for three hours to dry.

Next put on the skid-braces as shown (A-3), scribing the bottom ends so they make good contact with the runner. Always use glue in every joint; it will be more important than screws or nails when it dries.

MAIN DOUBLE STRUTS: (A-4) Cut the front struts to correct length as shown, taking dimensions from the *top* of the skid. Place both pieces in position at an exact right angle to top of skid, clamp firmly in place, and drill holes for bolts (C-9). Bolt on firmly without glue, until other struts are ready. Proceed in similar manner with top horizontal strut (A-7) and rear double strut (A-4) making sure that A-7 is parallel *(Continued on Page 68)*

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An Airy Chat with the Editor

(Continued from Page 10)

and can hardly wait for July number. I used to read this magazine some months ago and then it was changed to AERONAUTICS, ***if I am not mistaken. That book didn't click with me at all. Too many construction articles for the average person. You can imagine my surprise when my newsdealer showed me my old favorite again. This is somewhat smaller than the old book, but the stories are just as interesting and are easy to understand.***

"I liked the story 'Plane Mechanic Must be Fool Proof,' 'Why I Am a Pilot,' 'Sensations of a Parachute Jumper,' gave me a thrill, 'Practical Lessons in Flying' sure gave me a kick. I laughed at the time the instructor was nearly blown out of the cockpit. It seemed so real I could feel the breeze.

"Oh, Hell! why beat around the bush, I liked the whole Magazine."

Don't worry, Carl, you're going to get exactly what you want. I'll bet the stories and articles in this issue were just what you would have picked yourself if you were in my place. But didn't your school teachers ever tell you not to swear. I'll bet you learned to cuss trying to fly a home-built glider.

AND now for a FREE offer. P. C. Kullman & Co., 110 Nassau Street, New York, N. Y., have very kindly made the following offer to our readers:

"We have recently compiled a copyrighted folder—

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giving their numbers, names, symbols, atomic weights, melting points and years of discovery. We believe the folder would prove of interest to the readers of POPULAR AVIATION, *if you would give it in a few lines, a review, and mention that copies of the same can be had GRATIS UPON REQUEST."*

Those of you who wish a copy of the Kullman *(Concluded on Page 66)*

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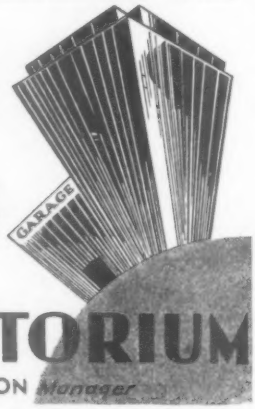

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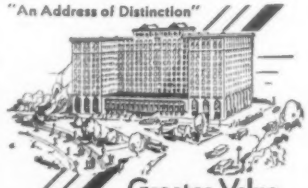

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An Airy Chat with the Editor

(Concluded from Page 64)

Co. folder are privileged to write direct to them for your free copy.

DOC Schurmacher, an ardent reader of POPULAR AVIATION as well as a valued contributor, has given us some exclusive inside dope. Doc incidentally, is an authority on outboard motors and boating, and is working on several outboard aviation articles for us.

"This is absolutely exclusive—you may predict it editorially if you wish, but nothing will be released on it for some time.

"Heinen (I think you spell it that way) who came over with the Graf Zeppelin on its first trip is at Atlantic City backed by Mr. Campbell, vice-president of the Philadelphia Rapid Transit Co., intends to make 100-foot baby blimps capable of landing on either land or water with 25-foot mahogany car powered by 225 h. p. motor. Will accommodate 12 or 14 passengers and sell at $12,000. Can be moored to ringbolt set in concrete. Costs $75 to fill bag, refill every three or four months. I have it on good authority that the first one will be ready for flight within about a month."

Thanks, Doc. Our readers deeply appreciate the advance news. We are heartily in favor of building baby blimps for popular consumption, and when they get them down to $200 or $300, where they belong, just drop me a line.

THE last letter for the time being comes from a young lady, Jane Bickford of Adams, New York. Welcome to our fold, Jane, and let us hope that there are many other Janes reading this column. Or do they all read Lady Heath's column and throw the rest of the magazine away?

"I'd like to congratulate you upon your new magazine. I liked about everything in the first issue, especially the information about gliders and models. In fact, it is just the aviation magazine I was looking for and couldn't find. The others are either purely sensational or are intended for professionals and are too advanced technically.

"Would you please send me information about gliding schools? I would like to know whether there is any place near Gloucester, Mass., where I could learn to fly or build them. And how is the best way to find out enough about their construction to build one with my friends? Would practicing by building model planes be any help?"

You're darn tootin' model building will teach you a great deal about planes. A model is constructed much like a real airplane, and must be as aerodynamically correct as the Dornier DO-X. Doesn't the little Heath or Aeronca stay up in the air for the same reasons as does the 32-passenger Fokker? For a list of government approved or licensed schools write to the Department of Commerce, Aeronautics Branch, Washington, D. C., or simply turn to the advertising pages of POPULAR AVIATION and select your school from the many excellent schools advertising in POPULAR AVIATION.

B. G. (Bob George) Davis.

HERE THEY ARE!

A Complete list of gliders on the American market. Read about them in POPULAR AVIATION

Make	*Price*
Glide-Air	$ 175
Primary Aeroglider	225
Cessna C. G. 2	248
Woerner Intermediate Glider	300
Alexander Trainer	375
Waco Glider	385
Mead Rhon Ranger	395
Aerobat	395
McGill A-1	395
Mattley Primary Trainer	435
Detroit Gull	435
Blondin Gull	500
Cook Primary Trainer	500
B. M. Cadet	525
Mattley Secondary Trainer	535
Leonard 2-Place Glider	550
Bowlus Trainer	550
Heath Super Soarer	575
Peel Glider Boat Z-1	595
Crawford's Powered Glider No. 2	600
Dragonfly	650
B. M. Trainer	650
McGill B-1	795
Bowlus Albatross Sailplane	975
Crawford's Powered Glider No. 1	975
Woerner Sailplane	1200
Wichita Soaring Plane F-1	1250
B. M. Condor Soarer	1500
The Buzzard	1600
All American	——
Northrop Glider	——
Evans All-Steel Glider	——
Braley Skysport	——

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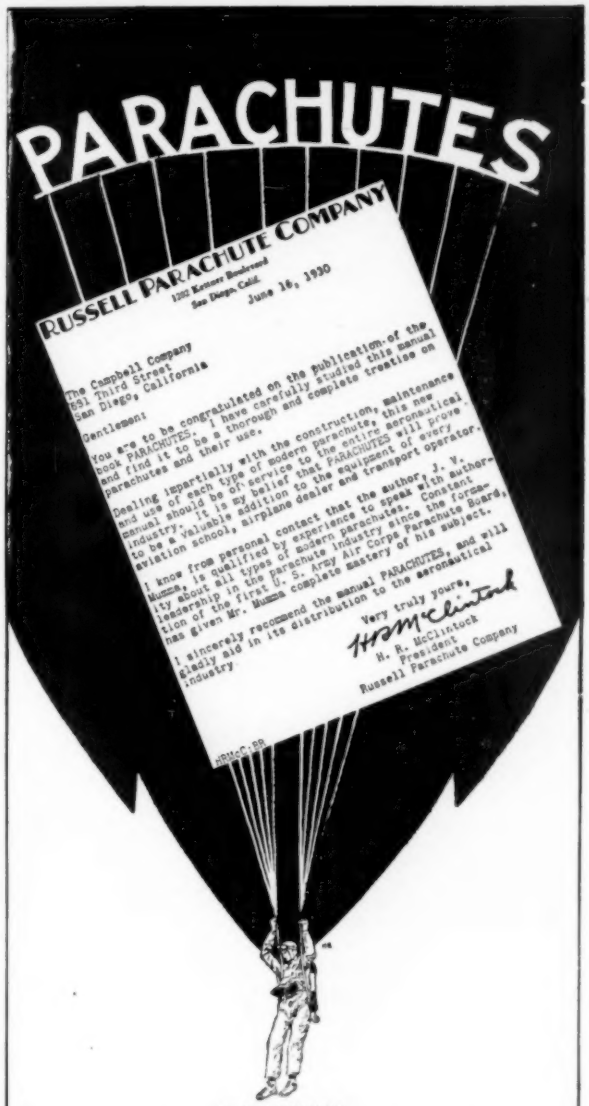
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June 16, 1930
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You are to be congratulated on the publication of the book PARACHUTES. I have carefully studied this manual and find it to be a thorough and complete treatise on parachutes and their use.
Dealing impartially with the construction, maintenance and use of each type of modern parachute, this new manual should be of service to the entire aeronautical industry. It is my belief that PARACHUTES will prove to be a valuable addition to the equipment of every aviation school, airplane dealer and transport operator.
I know from personal contact that the author, J. V. Mumma, is qualified by experience to speak with authority about all types of modern parachutes. Content leadership in the parachute industry since the formation of the first U. S. Army Air Corps Parachute Board, has given Mr. Mumma complete mastery of his subject.
I sincerely recommend the manual PARACHUTES, and will gladly aid in its distribution to the aeronautical industry.
Very truly yours,
H. R. McClintock
President
Russell Parachute Company

By J. V. MUMMA

PARACHUTES, the new manual by a national authority, is now available for distribution. Containing information gathered from the U. S. Army Air Corps, U. S. Naval Air Service, Irvin Airchute Company, Floyd Smith Safety Chute Company, Triangle Parachute Company and the Russell Parachute Company, and written from the author's ten years experience in the parachute industry, this book is the first complete treatise thoroughly detailing the maintenance, construction and use of modern parachutes.

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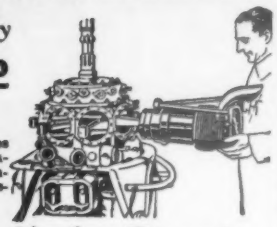

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Popular Aviation—September—1930.

CALIFORNIA TECHNICAL COLLEGE
San Diego *California*

The Rhon Ranger

(Continued from Page 62)

to top of skid. With these pieces bolted but not glued in place, cut and fit main single strut (A-5) as shown. After checking all dimensions and angles, take out bolts and apply plenty of glue to all joints. Bolt firmly together again and set aside on a level spot to dry. See that struts or other parts are not leaning against anything in such a way as to twist or warp the frame while the glue is setting.

Directions for Assembling Fuselage (Rear Section)

REMEMBER to glue both sides of all joints. It is advisable to have a wide flat bench for this part of the work. If not available, lay two wide straight planks across a pair of sawhorses, nailing them in place temporarily.

Lay the top longeron (B-1) along the edge of the bench, see that it is perfectly straight, and clamp it in position. Cut it to correct length, and mark off the points where the rear-section double struts (B-4) are placed, as shown on the drawings. Next place the stern post (B-3) in position at right angles to the top longeron, cutting it about an inch longer than shown so that it can be mitered to fit the lower longeron.

Now place the fuselage front section in its proper position relative to the top longeron, taking care to see that the two top longerons form a perfectly straight line. When this is done, mark the point at the back of the front section where the runner and skid meet. Make a clear mark on the bench at this point so that the lower longeron will meet it exactly when the two sections are put together.

Next lay the rear lower longeron (B-2) in position starting from this point and crossing the stern-post 13 inches below the under side of the top longeron. Draw a sharp line across the stern-post along the side of the lower longeron, and cut off stern-post on this line. Drive nails lightly beside all parts to hold them in place, and mark off the points for the double struts according to the plans. Lay the strut strips (B-4) across the longerons at these marks and cut the strips off flush with the outside of the longerons. When this is done lay the struts together on top of the longerons, hold or clamp firmly in place, and drill holes for bolts as shown.

Now cut the filler blocks to size and glue them in position, clamping them to the longerons for two hours or more.

While this work is drying, set the double struts in pairs, tack together with about three 1/2" nails, and cut the center portions down to 1-1/4" wide as shown. To accomplish this, it is best to draw a clear straight line the proper distance in from the edges, curving out at the shoulders, and then, with the struts held in a vise, saw from the edge to this line at a point about three inches down the shank from each shoulder. Then with a draw-knife or coping saw cut out the piece between the sawcut and the shoulder. This gives you a chance to get a ripsaw in position to make a straight cut right along the line. Repeat the above on each pair of struts.

When the struts are ready, set them together with the longerons, check for straightness, etc., and then glue and bolt the whole rear section together, giving it two or more hours to dry.

When setting the frame aside to dry, be sure it is not resting in a way which will twist or warp it while drying.

YOU ARE NOW READY TO BUILD THE TAIL SURFACES

WHEN the series on the Rhon Ranger are completed, POPULAR AVIATION *will begin a series of articles on the construction of a lightplane. What type would you like to build. Shall it be a mono or biplane? One or two passenger? High or low wing? Write a letter to the editor telling exactly what type of lightplane you want to build. Preferably, name the make of plane whose plans you would like to have published. In making the final selection for the plans to be published, the editor will be guided by your preferences.*

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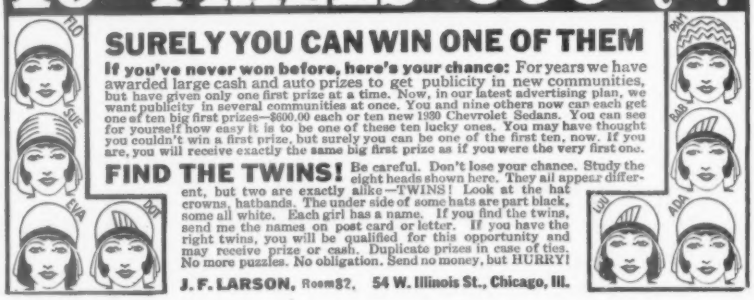

FIND THE TWINS! Be careful. Don't lose your chance. Study the eight heads shown here. They all appear different, but two are exactly alike—TWINS! Look at the hat crowns, hatbands. The under side of some hats are part black, some all white. Each girl has a name. If you find the twins, send me the names on post card or letter. If you have the right twins, you will be qualified for this opportunity and may receive prize or cash. Duplicate prizes in case of ties. No more puzzles. No obligation. Send no money, but HURRY!

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Wheeling, W. Va., March 8, 1930.

Gentlemen:

Everything arrived safe. Boy! They sure are good airplanes. Mother said that it wasn't worth anything if it's only $2. But now she's said it's better than the one I bought for $4.98. It flew for 50 sec. r. o. g. Hand launched 1 min. 3 sec. before it hit a wire and pulled the wing off.

Yours,
V. Ssellgo

WINGS FOLD BACK like those on REAL FAIRCHILD

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To be covered with imported silk, genuine Hawk olive drab and yellow dopes thinned down for model use. Can. and west of Denver postpaid $5.50; U. S. postpaid.... $5

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Every important detail of LINDBERGH'S Transcontinental Record Breaker has been reproduced in this flying Lockheed Sirius or "Dog Star" plane. Streamlined pants, gold-and-orange pin striping, brilliant black fuselage and orange-red wings. Even the Lockheed trademark and Lindy's famous license number "NR-211" furnished in all kits. N. A. C. A. cowling gives it a speedy, racy line. Using Champion's featherweight construction methods, you should obtain unusual duration. It is the hottest model for 1930 and you will be the envy of every boy who sees it. Get one Now.

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Hand Carved 10-inch Prop. Included with Above Kits

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Build and fly a 2-foot model of the famous Endurance "City of Chicago", the keen looking Stinson-Detroiter cabin monoplane. Finished in the new black and white triangle effect, used on all new Stinson planes. City of Chicago insignia. Celluphane windows. Formed prop, prop block, materials for Wright Whirlwind motor dummy, celluloid wheels, U. S. Navy Specifications balsa. Champion's new rubber thread motor, reed, bamboo, dope, cement, formed wire fittings, complete directions and drawings in stout mailing tube, a $5 value sold direct to you. Can. postpaid $2.20. U. S. postpaid. $2

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Blown celluloid pants, lighter than balsa. Celluloid cowling, windshields, leather-trimmed cockpits with original instrument panel installations reproduced. Rubber-tired wheels. Hand-carved standard pitch 14-in. balsa prop. Ball-bearing shaft. Landing gear attaches to wing, so it can be adjusted for correct flight. Wing span 4 feet. Covered with imported thistledown-weight silk. Canada and west of Denver postpaid $10.50. U. S. postpaid..... $10

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See last month's advertisement in Popular Aviation for full contest details, or get them with orders from this advertisement.

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4-foot high flying record-maker, offered at lowest price ever made on model of this size. Easy to build. Easy to fly. On our pavilion ground N-X-E41 left ground after 2-foot run and zoomed altitude like a Curtiss Texaco. This type has unofficial 41-minute duration made by gaining 150 feet or more altitude, then duration by flat glide and favorable wind currents. Class 1 contest model. Maximum cross section and wing area to qualify for A. M. L. A. or any other outdoor contests. Full size blueprint, directions, 20-ft. Champion's new rubber turning age 16-in prop., everything needed, complete in mailing tube, Canada postpaid $2.20. U. S. postpaid..... $3

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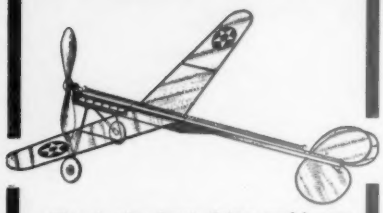

This is the finest flying model ever made. The light construction makes long flights possible, and the flexibility enables this plane to stand up under abuse where a heavy, rigid plane would crack up. The controls are adjustable for any direction of flight such as circular flights, loop the loops, barrel rolls, etc.

KNOCKED DOWN—easy to assemble—everything cut, drilled, and bent to shape—all materials furnished. No tools are needed. $2.50 postpaid.

FULLY ASSEMBLED—READY TO FLY—Beautifully decorated in Vermilion and Oriole Yellow on transparent wings. $3.75 postpaid.

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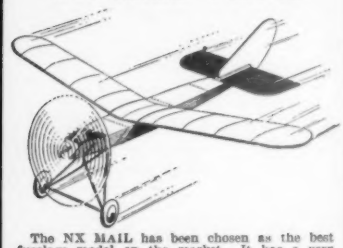

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Practical Lessons in Flying

(Continued from Page 50)

speed. When flying in a wind, we can fly at a constant air speed and yet pass over the earth at varying ground speeds depending on the direction of flight in respect to the wind. If the wind should have a velocity equal to the air-speed of the ship, then, the ship will not move at all in regard to the ground when it is headed into the wind."

Their first position is shown by Fig. 5 where they are heading into a 30 mile wind while the ship speed is 40 M. P. H. As shown at (d), the difference is 10 M. P. H. so that they pass the building at only 10 M. P. H. although the engine is still pushing the ship along through the air at 40 miles per hour. The same thing happens when a motor boat is going upstream against a heavy current. In aviation, the ship is said to "have the wind on her nose." In Fig. 6 the ship "has the wind on her tail," or is flying with the wind, so that the ground speed (d) is now the sum of the wind and air-speeds or 70 M. P. H.

"Now this is not only interesting but has a marked practical value," advised the pilot, "by looking at the passing objects around you it may seem that you have sufficient flying speed to be perfectly safe, but as a matter of fact the air-speed may be so low that you are at the stalling point. This sort of estimate is dangerous.

"THE stalling speed, or the air-speed at which the wings lose their lift in this ship, is about 30 M. P. H. If we can't keep the air coming over the wings faster than 30 miles per hour she will stall and drop. However, if we should be flying with the wind, and judging our speed by the ground rather than by our instruments, then it will be a very easy matter to get into a stall and usually this is the way stalls occur. If the wind speed should be 20 miles per hour while the ship is at the stalling speed of 30 M. P. H., then the apparent speed judged from watching the ground will be 50 miles per hour, and yet we are actually at the stalling point. If we should throttle down the slightest bit, then down she comes.

"In general," continued the pilot, "there are two methods of telling when the ship is approaching the stalling point. One method, of course, is by the air-speed meter mounted on the dash. The second method is by the feel of "sloppy" or "flabby" controls at stalling speed, for at this low speed neither the ailerons, the rudder nor the elevator have much effect upon the control of the ship. Just as with the wing surfaces, the air pressure is now too much reduced to make the control surfaces effective. The air pressure on the control surface is a rough and ready means of judging speed for the pressure will vary the resistance or "stiffness" offered to moving the stick or rudder-bar. With no wing lift, and the controls lack- *(Concluded on Page 72)*

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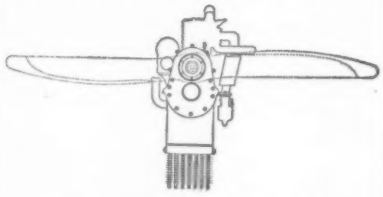

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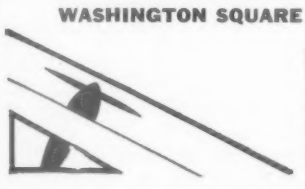

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Assuring you of my sincere appreciation for all the things you have done for me, I am
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Dear Major:
I deem it an honor to be one of your students and have always found your instructions and service the best obtainable, because you give your students the knowledge needed by them in the simplest, shortest method possible.
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Louisville, Ky.

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I want, at this time to express my appreciation for the courteous attention I have always received from you.
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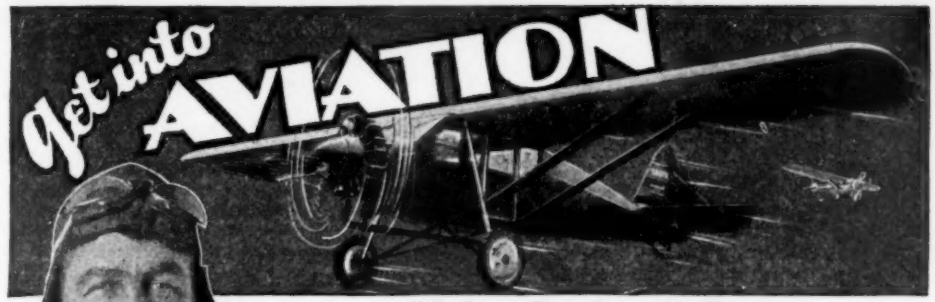
Hamilton, O.



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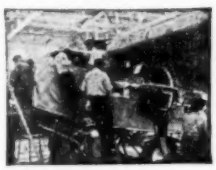

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Dear Major:
Your excellent advice prevented me from taking up Aviation the wrong way when I wanted to learn flying first. After I had completed your ground course, which thoroughly prepared me in the principle of flight, I was able to solo in 7 hours. I always will be glad to tell anyone that I am a Rockwell trained man.
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Practical Flying

(Concluded from Page 70)

ing authority, it is easy to see what a nice predicament you are in when stalled.

"I will just give you an example of a stall, now that we are up to 3,000 feet, and maybe I will give you an example of a spin if your breakfast is well settled. If you think you are strong enough to stand the strain, just put up your right hand." Bob hesitated a moment, got up his courage and up went his hand in assent. What happened then is nobody's business. We will tell about the stall and the spin, but we will leave the rest to your imagination at the point where they started washing up the ship after landing. Bob's breakfast was a total loss and we will not deny it.

THE stick moved back slightly and the engine was throttled down. The pointer on the air-speed meter fell back rapidly from 110 M. P. H. to 60, then 50, then 40, and then came the word, "Stalled." For the moment, Bob noticed nothing radically different—there was no marked change that would call his attention to the fact that the surfaces had lost their grip because he did not have his hands on the controls. In another moment, however, the nose went down, and at the same time he saw the left wing tip follow suit—and then the spin began. Rather slowly at first, but gaining speed rapidly, the tail began to chase the nose around in a dizzying circle while the whole earth spun around with a sickening rotation. Faster and faster, dizzier and more sickening became the whirling motion of the earth below him until he could stand it no longer—and he parted with the ham and eggs that he had so eagerly taken aboard at 6:30 A. M.

Whether he lived or died made no difference now. Whether Ed got her out of the spin or failed was a matter of the slightest indifference. "Blah-blah-blah" came over the phones but he paid not the slightest attention. As a matter of fact, Ed had taken her out after about six turns, but this seemed like a year to our hero. A queer smile came over the pilot's face as he whispered to himself, "I'll bet that bird is tame enough now and there will be mighty little strutting after the gang hears about this."

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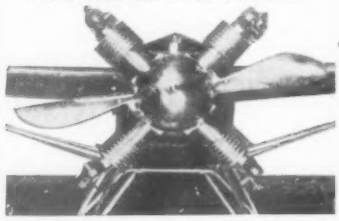

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Forced Down on the Open Sea

(Continued from Page 22)

hoping against hope that the wind would not blow us away from it and toward the open sea.

At midnight, the searchlights of the cruisers were discernable about fifty miles away, but they came no closer.

The waves grew higher, so we inflated our life-jackets and strapped them on. It looked as if, despite our best efforts, we were to lose the plane.

But we did stay right side up, speeding through the water at such a rate that our wake was bright behind us. At two A. M., we were within two hundred yards of the island—and the plane was safe!

THEN as if fate had determined to down us, there appeared from nowhere, a coral reef just a few yards ahead. By sheer luck, we managed to steer clear, and hold a course parallel with the length of the island. Then we realized that a continuous barrier of reef guarded the shore, and it was imperative to get over it to reach the island.

Near the reefs the waves were not so high, so we both got out with our shoes on, to protect our feet against the coral. With the help of each wave that came along, we lifted the plane toward the quiet water near the shore. We were successful at last, but our problem was not yet solved. What to do with the plane? There was no beach to the shore. It would be tough luck indeed to have the ship break up on a reef after all it had been through. Fortunately, we came upon a rude sailboat riding easily at anchor. We found a rope, and tied up astern of her.

For the first time in more than twelve hours, we relaxed. Still we were not sure of what lay before. There was the story of a Marine sergeant observer who was killed and, it was reported, eaten by the Cacos while he was guarding a plane which had been forced down. We had vivid pictures of being cooked in some cannibal's pot within an hour. But there was the boat —symbol of civilized man—and we waded ashore intent upon arousing any population that might live on this steep mountainous island. Soon our cries were answered in a corrupt sort of French, and twenty weird but undoubtedly friendly negroes crept through the bushes, to look with wonder at us and our strange craft.

We managed to make them understand that we needed "petrol et huile" (gas and oil). They conferred, and the spokesman announced that there was an American on the other end of the island, and we could get supplies from him; that they would rent us a boat to go after what we needed, in the morning. I didn't tell them that my friend had no money with him, and that my own cash totaled one thin dime. We could probably borrow money from the American, and its lack might influence their generosity.

WE HAD had no water, so we took a chance on theirs, and followed them to a hut to get it. The hut was woven of tropical undergrowth, for there is no decent wood on that part of the island. It was primitive, but to us a haven of Paradise. The people were hospitable, insisting that we drink "cafe" with them.

Until daybreak, we sat in the plane, then we assisted the natives to rig crude sails on the boat, agreed to pay them six dollars for its use—which is more than they ordinarily make in six months—and my observer set out to get the gas and oil. I stayed with the plane, and examined her thoroughly. Although the reef had scratched lots of paint off the pontoon, to my great joy, she was otherwise unhurt. Some luck!

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How did we get lost in the first place, and what happened to the other plane?

I found out later that the chart carried in the other plane had come loose from its fastenings and blown overboard, probably while they were being catapulted; and the observer who thought he knew the way had given the pilot wrong directions. Moreover, the senior pilot found that everything had closed in Port au Prince at noon, and it was nearly three hours before he could get gas and oil and organize a search.

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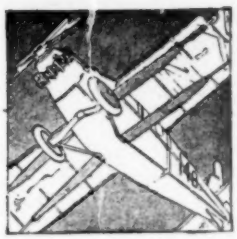

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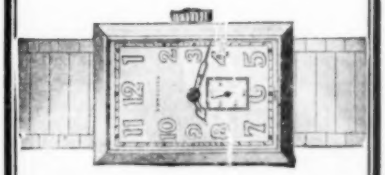

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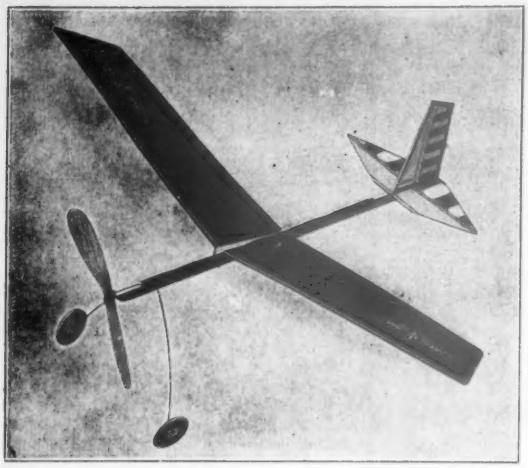

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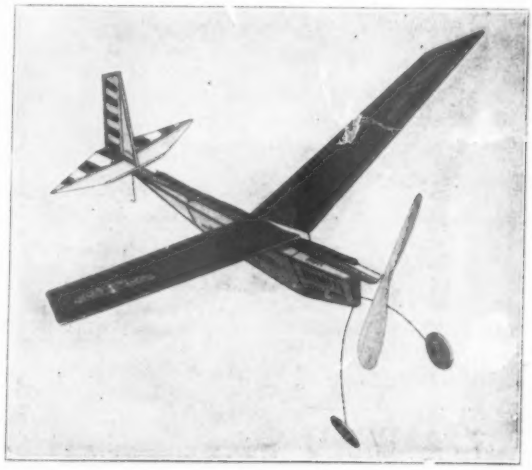

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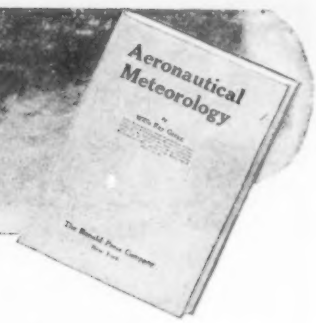

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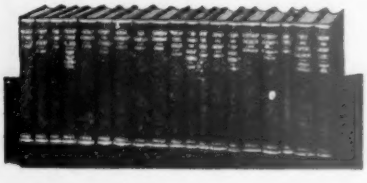

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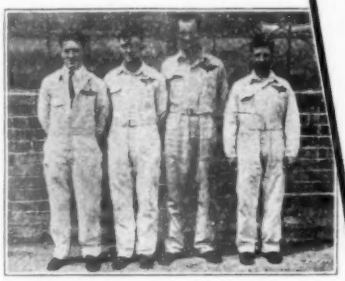

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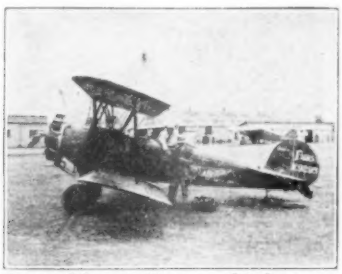

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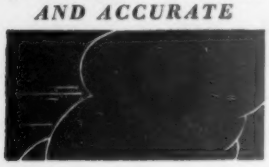

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